UNIVERSITY CLUB
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June 1942

TECHNOLOGY REVIEW

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BADGER { Engineers and Constructors for Processing Plants
Special Processing Units

The Combined Services of Specialists Who Have Served Many Fields of Processing

AS OUR chemical era unfolds, processing becomes both more complicated and more interrelated. Notice what's happening in the petroleum industry. It's fast becoming a producer of vital chemicals. Witness the things being done chemically with sea water. And take the rapidly expanding plastic industry!

The complexity of processing involved, *combined with the urgent need to get things done,* makes the services of an organization of engineers and constructors such as Badger can provide especially valuable.

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E. B. BADGER & SONS CO.

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Chemical Engineers and Contractors Specializing in Distillation, Evaporation, Extraction and Solvent Recovery

UNIVERSITY CLUB

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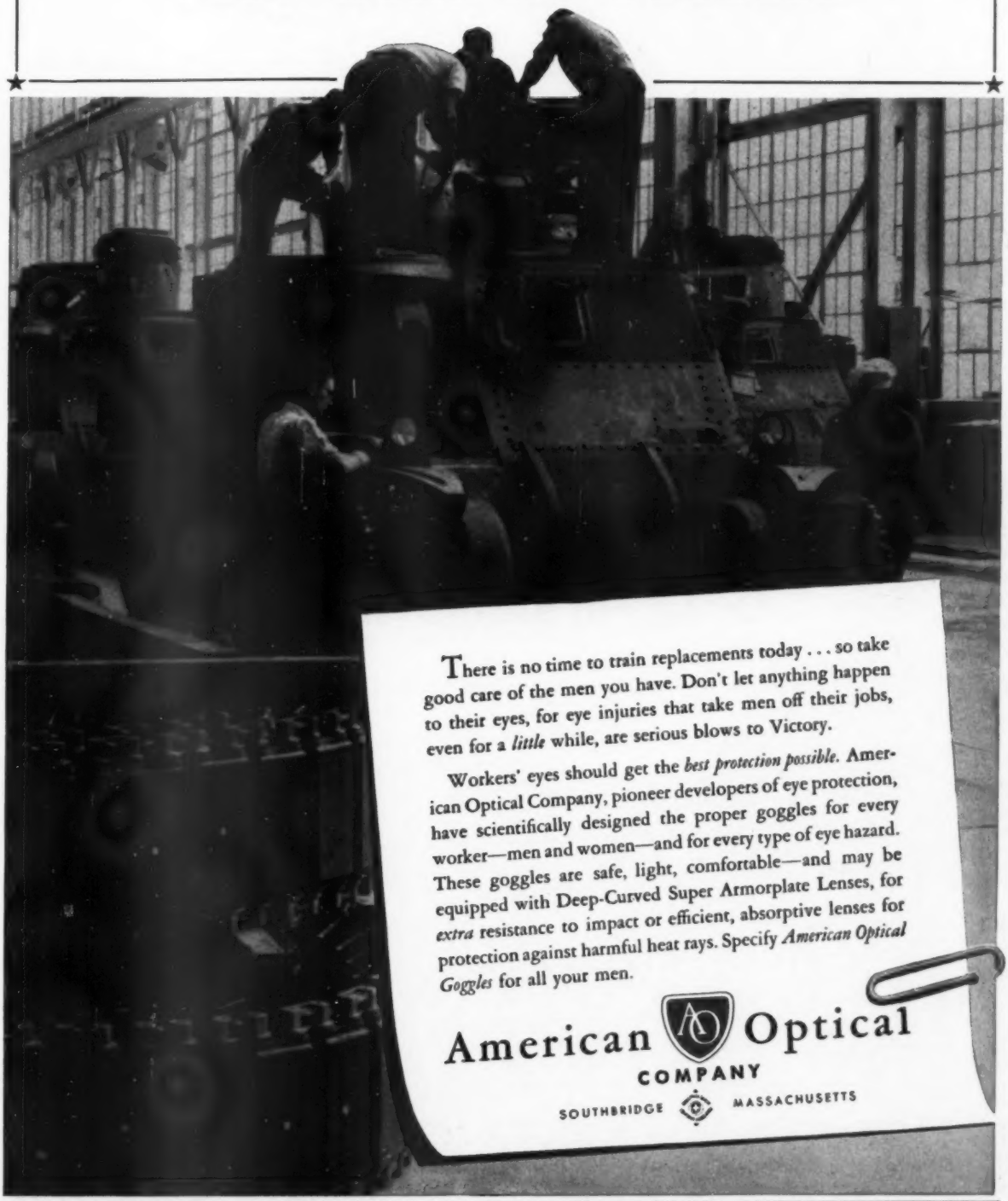
You can't replace these Workers

MAKE SURE
THEY WEAR AO GOGGLES



There is no time to train replacements today . . . so take good care of the men you have. Don't let anything happen to their eyes, for eye injuries that take men off their jobs, even for a *little* while, are serious blows to Victory.

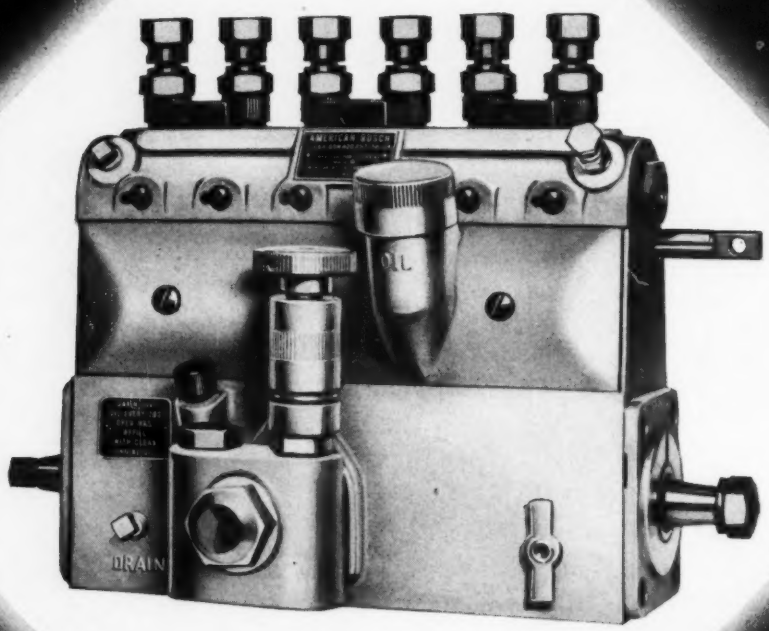
Workers' eyes should get the *best protection possible.* American Optical Company, pioneer developers of eye protection, have scientifically designed the proper goggles for every worker—men and women—and for every type of eye hazard. These goggles are safe, light, comfortable—and may be equipped with Deep-Curved Super Armorplate Lenses, for *extra* resistance to impact or efficient, absorptive lenses for protection against harmful heat rays. Specify *American Optical Goggles* for all your men.

American Optical
COMPANY
SOUTHBRIDGE MASSACHUSETTS

THE TECHNOLOGY REVIEW, June, 1942. Vol. XLIV, No. 8. Published monthly from November to July inclusive at 10 Ferry Street, Concord, N. H. Publication date: twenty-seventh of the month preceding date of issue. Annual subscription $3.50; Canadian and Foreign subscription $4.00. Entered as second-class matter at the Post Office at Concord, N. H., under the Act of March 3, 1879.

TRIBUTE TO

NEW ENGLAND CRAFTSMANSHIP



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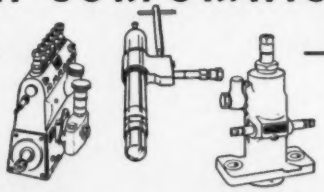

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POWER TO SPARE – to handle today's carbide jobs.
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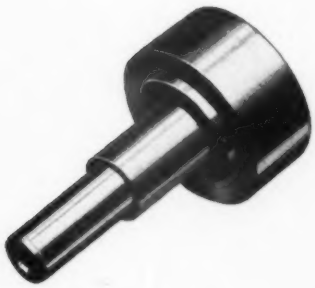
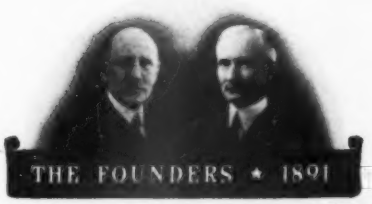
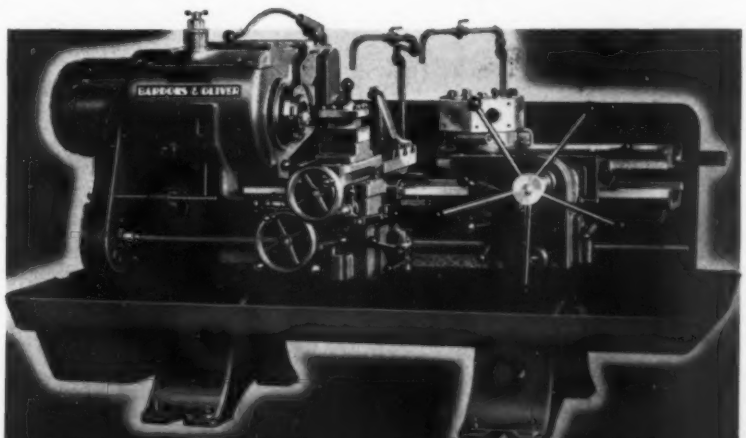
HIGH DEGREE OF ACCURACY – to produce a high quality product.
LOW MAINTENANCE – to keep your production rolling steady and your cost low.
All of these worthwhile advantages will be yours with a Bardons & Oliver Turret Lathe.





THE FOUNDERS ★ 1891



BARDONS & OLIVER, INC.
1153 W. 9TH ST. . . CLEVELAND, OHIO

Lockwood Oliver, '23, President Sidney E. Horton, '90, Director

The Navy may not know it, but this "E" stands for Engineers

IT was a mighty proud day in the lives of the employees of the Westinghouse Electric Elevator Company when a certain bit of bunting was hoisted up the flagstaff at our plant.

For the Navy "E" pennant is the highest service award the United States Navy can make—it's their way of saying, "Well done."

Literally, of course, that "E" stands for Excellence. But every time we look out the window and see the pennant waving beneath the Stars and Stripes on our flagpole, it seems to say, "Engineers," to us.

Here's why.

This Westinghouse plant had always made elevators—elevators now in use in many of America's tallest buildings. *Today, it is turning out naval ordnance at an ever-increasing rate.*

The job of manufacturing complicated war machinery called for the highest type of engineering skill. Credit for the success of that job, which resulted in our winning the Navy "E", goes largely to Westinghouse engineers.

Never have we been prouder of the fact that ours is "an engineer's company."

FRANK C. REED, *President*
(CLASS OF 1903)

ROSS RATHBUN, *Sales Manager*
(CLASS OF 1912)

Westinghouse Electric Elevator Company

150 PACIFIC AVENUE, JERSEY CITY, N. J.

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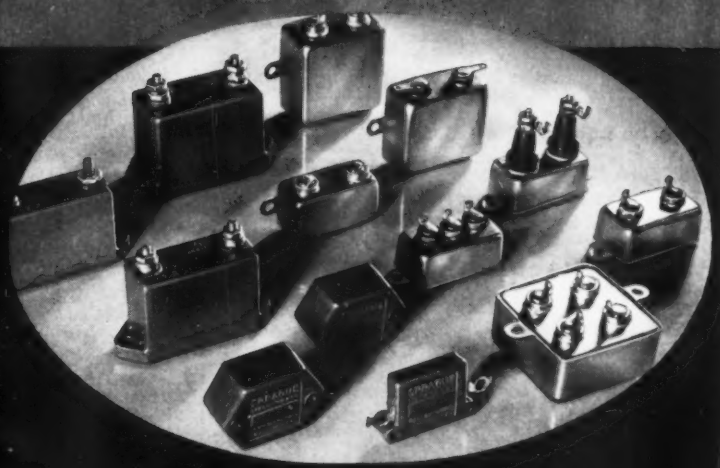
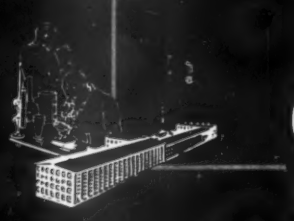
THERE ARE SPRAGUE CONDENSERS

Sprague Condensers are made to the highest quality standards in a complete line meeting practically every electronic, electrical and industrial need. It is natural then, that today's production is largely devoted to a complete, fully approved assortment for Army and Navy uses. Our engineers will gladly cooperate in solving your capacitor problems.





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CONDENSERS—KOOLOHM RESISTORS

Quality Components • Expertly Engineered • Competently Produced

SPRAGUE SPECIALTIES COMPANY, NORTH ADAMS, MASS.

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OHIO *Precision* GEARS

A large factor in the efficiency of the new

CLEVELAND Nº 1 VERTICAL MILLING MACHINE

Manufactured by the Sommer & Adams Co.

The new Cleveland No. 1 Vertical Milling Machine is small, compact, rigid. Designed to meet today's exacting requirements of high speed production, it is capable of handling heavier work, in wider variety, at faster speeds than the ordinary miller of this type. As developed by Sommer & Adams Company engineers it reflects the company's 20-year reputation as creators of special precision machines for the automotive and other high production industries.

One of the largest factors in the recognized efficiency of the machine is the head gears. These provide 3 speeds, the highest possible degree of accuracy, quiet operation, ease in speed changing and long resistance to wear. They are Ohio Gear, precision-cut, heat treated and shaved to insure quietness. They were specified by the company's engineers because of highly satisfactory performance by Ohio Gears in many of the company's special machines.

The use of Ohio Gears in precision machines assures the maximum of accuracy, service and economy in power transmission.

THE OHIO GEAR CO.

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Kansas City Rubber & Belting Co.
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GRAND RAPIDS, MICH.
W. H. Slaughter
419 Oakdale St., S. E.
*LOS ANGELES, CALIF.
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Standard Machinists Supply Co.
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F. E. Allen, 2665 Main St.

OHIO GEARS

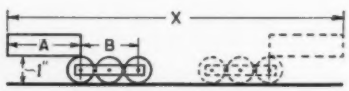
No. 44

Just for Fun!

A CHALLENGE

TO YOUR INGENUITY

THE diagram below indicates schematically a little problem encountered in our shop a short time ago. A member *A* moves on rollers, without slipping, from the solid line position to that shown dotted. What is the value of *X* in terms of the lengths *A* and *B*?



Solution: In spite of the apparent simplicity of the problem, it is easy to make a slip. The correct answer is that *X* equals three *A* plus two *B*. We hope it wasn't too obvious!

We specialize in industrial physics and offer a

"GUARANTEED RESEARCH SERVICE"

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West Orange, New Jersey

HIGGINS

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Vice President

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HIGGINS

HIGGINS INK CO., INC.
271 NINTH ST., BKLYN, N.Y.

THE TABULAR VIEW

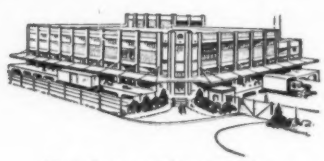
Air Power. — The Army's part in the upbuilding of American strength in the air, as it was recounted at Technology's Alumni Day Dinner by OLIVER P. ECHOLS, major general, United States Army Air Corps, is a story of careful planning and co-operative execution. General Echols' address (page 367) surveys not only the history of the Army's undertaking but also the mechanics of present methods used to bring projects into reality.

Things to Come. — What must America foresee as salient duties in the years after war is over? To this crucial question KARL T. COMPTON, President of the Institute, presented thoughtful and stimulating answers in his graduation address to the Institute Class of 1942. Victory by itself is not enough, Dr. Compton reasons (page 369), but must be consolidated and made the basis for a sounder organization of life.

Unfoldment. — However strong the contrasts may be between the education and science of today and those of half a century ago, the evolutionary process by which science grows has not changed and today offers rich and new opportunities for useful work. In his commencement address (page 371), SAMUEL C. PRESCOTT, '94, retiring Dean of Science at Technology, stressed this fact as reassurance to graduates in an unsettled world.

Chart. — A clear course for this year's generation of college people is seen by LEVERETT SALTONSTALL, Governor of the Commonwealth of Massachusetts, whose baccalaureate address to Technology's seniors (page 373) recalls memorable events and a memorable man in educational history. Governor Saltonstall's paper stresses the relationship between technology and society in adjusting the means of production to meet special demands.

Speed with Economy

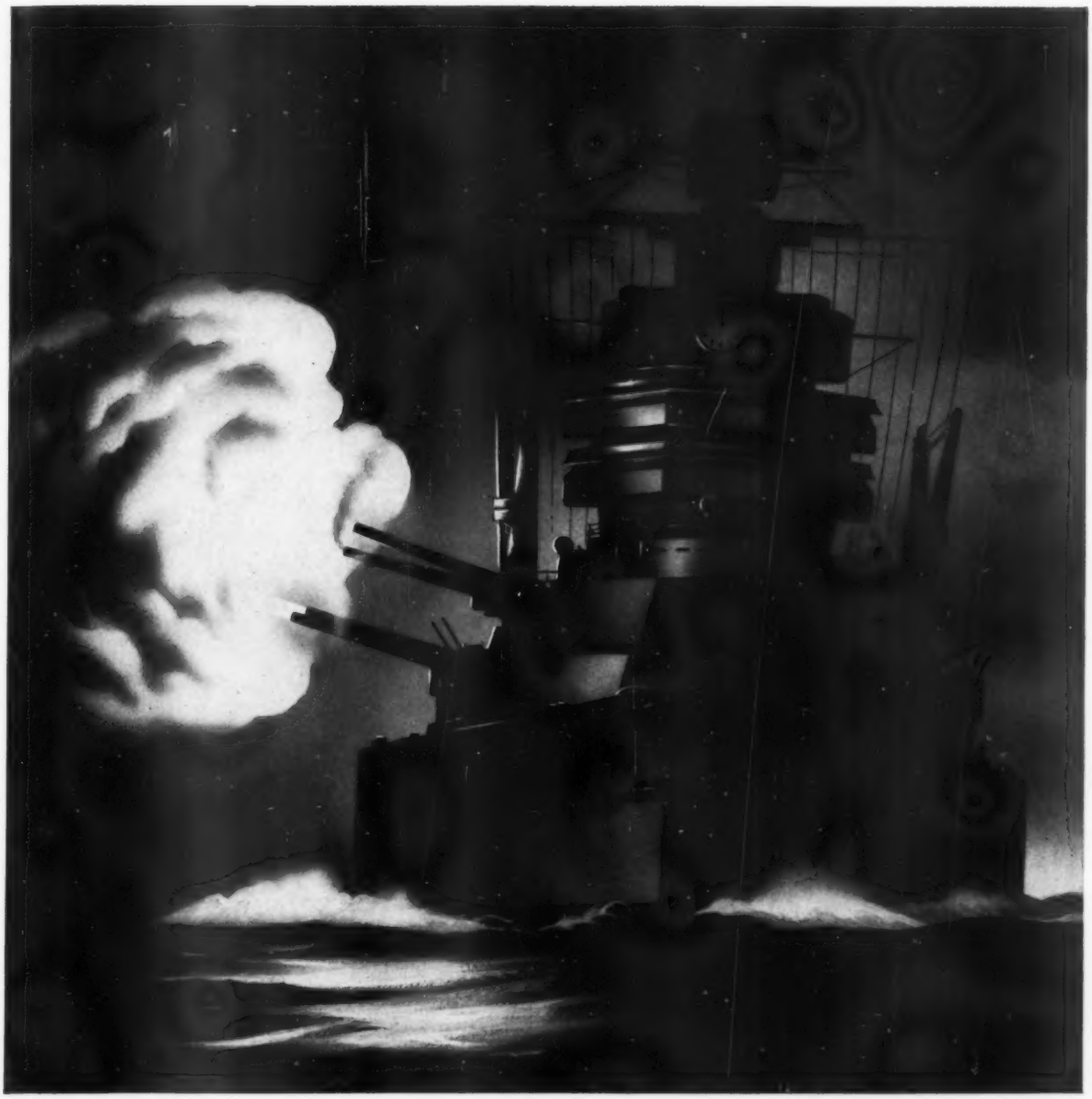


U. S. Industrial Chemicals, Inc.

If a new building will further the war effort, you can expect full cooperation from our government . . . But be sure to engage a builder familiar with priorities and equipped for fast construction.

W. J. BARNEY CORPORATION
101 PARK AVENUE, NEW YORK
INDUSTRIAL CONSTRUCTION
Alfred T. Glassett, '20, Vice President

JUN -1 1942



MOLYBDENUM ENLISTS FOR THE DURATION

The enormous increase in requirements of molybdenum has necessitated the War Production Board Order M-110, placing molybdenum consumption under allocation control...Our metallurgical research staff is fully engaged in war work. At our mine, mill and converting plant, every effort is being made towards maximum production.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.
MOLYBDIC OXIDE—BRIQUETTED OR CANNED • FERROMOLYBDENUM • "CALCIUM MOLYBDATE"

Climax Molybdenum Company
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MOLY

No000's Consistent Output
Speeds Production on Small Parts Milling
New operators learn quickly the simple operation of these productive machines — and maintain high output of defense products.
We are proud to be honored with the Navy "E", awarded for outstanding accomplishment in Defense production.
Brown & Sharpe Mfg. Co. Providence, R. I., U. S. A.
BROWN & SHARPE

BATH
IRON WORKS
CORPORATION

Shipbuilders and
Engineers

•

BATH, MAINE

MAIL RETURNS

Woe Is Us

FROM CHARLES E LOCKE, '96:

After having continually lauded The Review far and wide as the paragon of perfection and having praised its editorial staff as of a super-Sherlock-Holmes breed of error detectors ("If you see it in The Review, it's so"), I experienced a terrible letdown to find staring at me on page 271 of the April issue a picture captioned ". . . The original building of Governor Dummer Academy at Deerfield, Mass." Oh, Fred, how could you do this to me and so betray my confidence and trust in you? Won't the Governor turn over in his grave at this perversion of facts? In a historical novel, such a liberty on your part might have been permitted, but in the meticulously accurate Review, never! We all know that Governor Dummer Academy was born in South Byfield, Mass., and has continued to dwell there ever since. Please, therefore, get busy forthwith and move this educational landmark back to its proper natal site.
M.I.T., Cambridge, Mass.

Humbled and abashed, we offer apologies to a distinguished school, asserting that geographically we are Dummer than even we had thought. — Ed.

Again

FROM WELLES BOSWORTH, '89:

The frontispiece of your May number "struck my eye" with great interest and pleasure, and I looked to see who had designed the temple. Finding no name, I concluded that in your judgment mere architects are not of enough general interest to bother about. In that opinion the great majority of your readers will agree. Admittedly, architects so seldom produce things which give much pleasure that they don't deserve to be inquired about or known. Even when they do strike a note of beauty — as, for instance, the White House in Washington — who knows, or cares to know, the name of the architect?

Still, it may be observed that in the not far distant past, the Institute has encouraged some of its students to believe that architecture might be lifted (by a few of its devotees) to the plane of art. Today, in view of radicalism, Technology may feel apologetic for having done so, but as I looked at this picture, the thought occurred to me that its author might possibly be an Institute Alumnus, and I wondered, if he were, what would his feeling be to have the art of architecture so slighted by you — even if he were humble enough not to care on his own personal account!
Locust Valley, Long Island, N. Y.

And Again

FROM PERCY BUGBEE, '20:

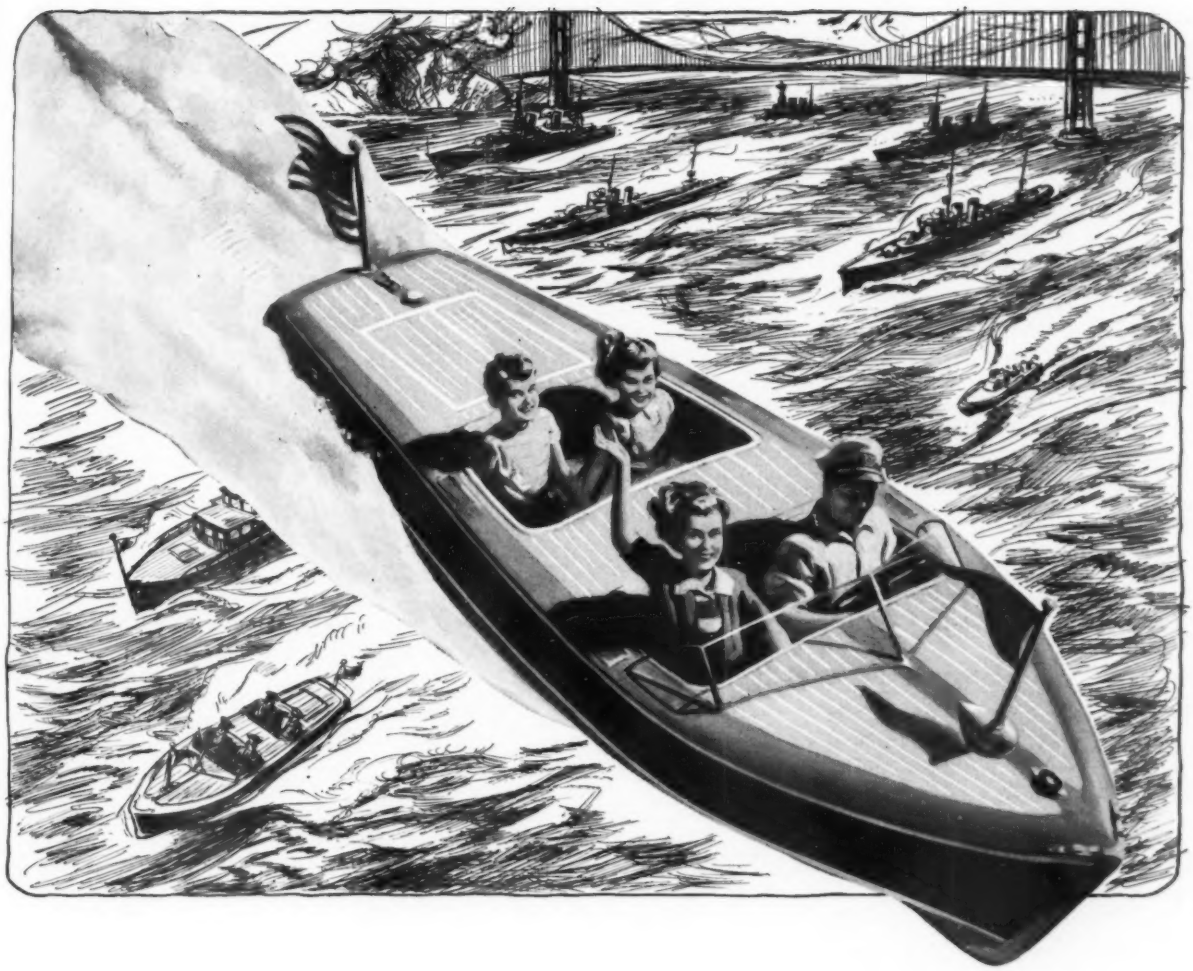
I feel sure that I speak for the many Technology graduates who are prominent in various phases of fire protection engineering when I say that we were surprised to see the frontispiece picture in the April issue of The Review showing a carpenter on some wooden scaffolding with a lighted cigarette in his mouth. In this country we have had a lot of disastrous fires in buildings under construction, and, of course, careless smoking tops the list of all causes of fire. Certainly the distinguished pages of The Review should not be used to encourage such hazardous situations.
Boston, Mass.

On careless smoking, agreed. But The Review pointed out that planners for the future seek improvement over the embodiment presented in its April frontispiece. — Ed.

But Not Now

FROM COLVER P. DYER, '22:

I enjoyed very much reading the article by Henry D. Hibbard, '77, in the April Review. Every once in a while one finds an article such as this — an article which is worth tearing out for future reference. It should be reprinted in some organ so that it might reach the teachers of the country.
Winchester, Mass.



Jim Eaton's speedboat is out hunting Japs . . .

She was a sleek mahogany runabout when she stole Jim Eaton's heart at the last motor boat show. But since then she has put on weight and been painted battleship gray. She is in the Navy now, patrolling a stretch of bay along the Pacific coast—part of an enormous fleet of patrol and picket boats, mine yawls and mosquito boats to which our builders of pleasure craft have turned their world-famous genius and facilities.

American builders of power boats know the meaning and methods of mass production. When they changed from yachts and runabouts to war craft the result was, not a trickle, but a swelling stream of boats for the Army, Navy and Marines.

When problems arose they were chiefly in adapting production methods to the new designs and special alloys required by war. In cooperation with Revere Technical Advisory staff, many famous boat builders made the change-over as smoothly as they would in producing a new model. For in addition to sound copper alloys, Revere supplies this service to help make manufacturing operations easier and quicker.

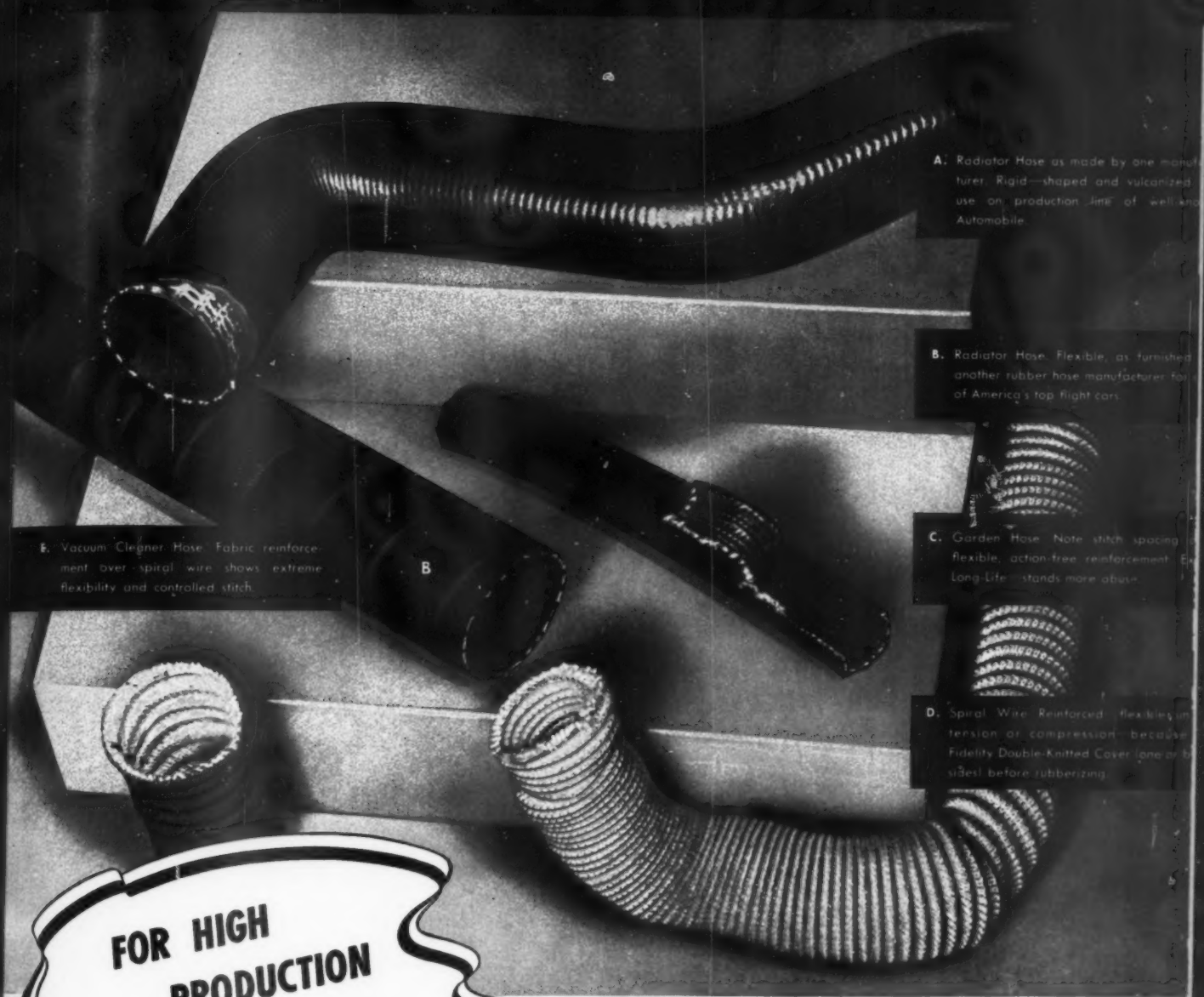
Every ounce of copper our country can produce goes directly into vital war materials. Fortunately, Revere is equipped with new plants, improved machines, advanced processes which add enormously to the nation's capacity to produce fine copper alloys. Not only are these plants working to the limit of their resources, but more facilities are steadily being added to bring the day of *victory* still nearer.

The Revere Technical Advisory Service functions in (1) developing new and better Revere materials to meet active or anticipated demands; (2) supplying specific and detailed knowledge of the properties of engineering and construction materials; (3) continuously observing developments of science and engineering for their utilization in producing methods and equipment; (4) helping industrial executives make use of data thus developed. This service is available to you, free.

REVERE COPPER AND BRASS INCORPORATED

EXECUTIVE OFFICES: 230 PARK AVENUE, NEW YORK

E
THE SECRETARY OF THE NAVY
WASHINGTON
April 4, 1942
Dear Mr. Payne:
It is a privilege for me to be able to advise you that the Navy Board for Production Awards has designated the Crane Packing Company a recipient of the Navy 'E' Award for production achievement.
Since nineteen hundred six the 'E' has been the traditional Navy symbol for excellence—for a job well done!
This is an honor not lightly bestowed, and one to be cherished by you and your associates.
As the Secretary of the Navy, and as a fellow American, I congratulate you upon the achievement of this honor. And in so doing, let me remind you that your company's contribution, together with that of other of our patriotic countrymen, is only the beginning. This production, increased manyfold, must and will become the tide of victory!
Yours sincerely,
Frank Knox
Mr. P. E. Payne, President
Crane Packing Company
Chicago, Illinois
JOHN CRANE
PACKINGS for the NAVY


A. Radiator Hose as made by one manufacturer. Rigid—shaped and vulcanized for use on production line of well-known Automobile.
B. Radiator Hose. Flexible, as furnished by another rubber hose manufacturer for one of America's top flight cars.
C. Garden Hose. Note stitch spacing for flexible, action-free reinforcement. Fidelity Long-Life—stands more abuse.
D. Spiral Wire Reinforced—flexible under tension or compression—because of Fidelity Double-Knitted Cover (one or both sides) before rubberizing.
E. Vacuum Cleaner Hose. Fabric reinforcement over spiral wire shows extreme flexibility and controlled stitch.
B

FOR HIGH PRODUCTION

FIDELITY HOSE REINFORCEMENT MACHINES

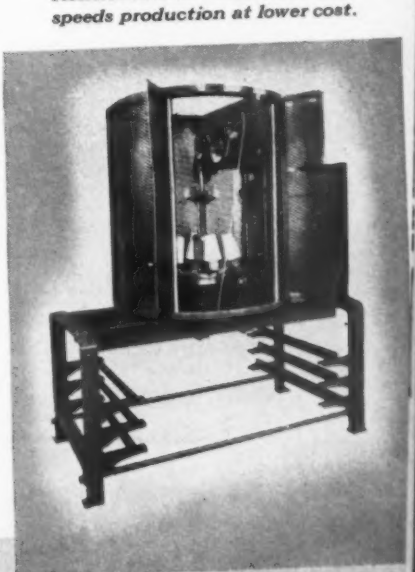
6 TO 10 FEET PER MINUTE

RECENT improvements in the FIDELITY Hose Reinforcement Machine make possible fabric reinforcement to rubber hose or tube: at higher speeds—6 to 10 feet per minute; over a greater range of diameters—¼" to 2¼" O.D.; in single or double stitch—in close or wide spacing; over rubber tube or spiral wire reinforcing.

Extreme flexibility, toggle action of formation, interchangeable knitting heads of three sizes and gear changes that control the stitch, readily adapt FIDELITY Hose Reinforcement Machines to a wide variety of applications in rubber hose and tube reinforcement. A few of these applications include: Radiator, Windshield Wiper and Car Heater Hose; Vacuum Cleaner Hose; Beverage Hose for Breweries, Dairies and similar industries; and Garden Hose.

Folder 641 gives you complete data on FIDELITY Hose Reinforcement Machines—Send for it.

• *Illustrated is the Fidelity Hose Reinforcement Machine that speeds production at lower cost.*



FIDELITY MACHINE COMPANY

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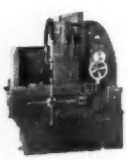

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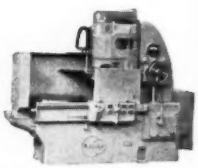

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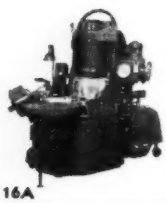

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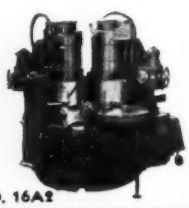

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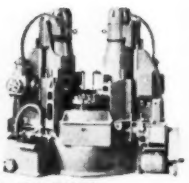

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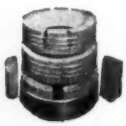

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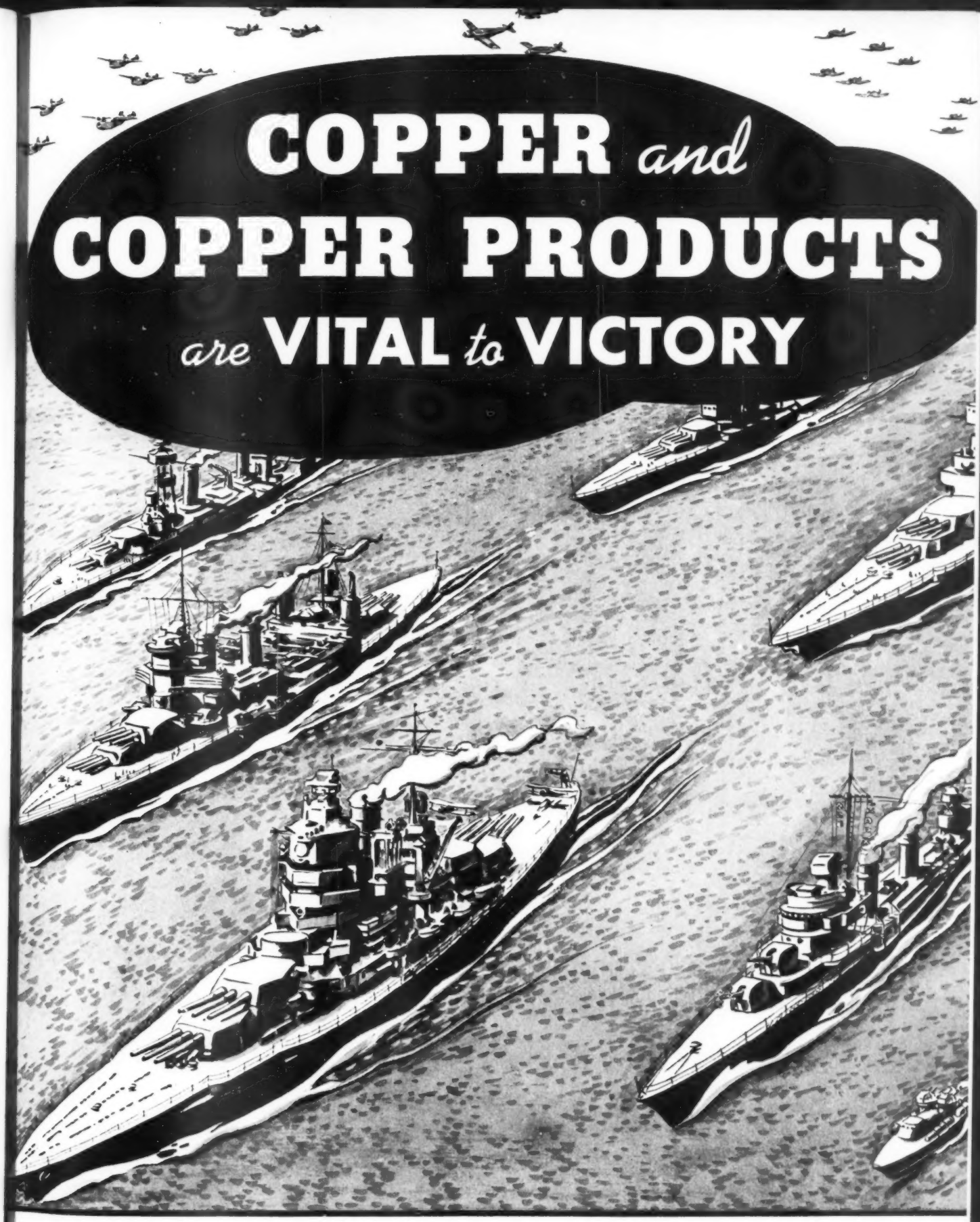
HENRY K. SPENCER '09, *Treasurer and Manager*



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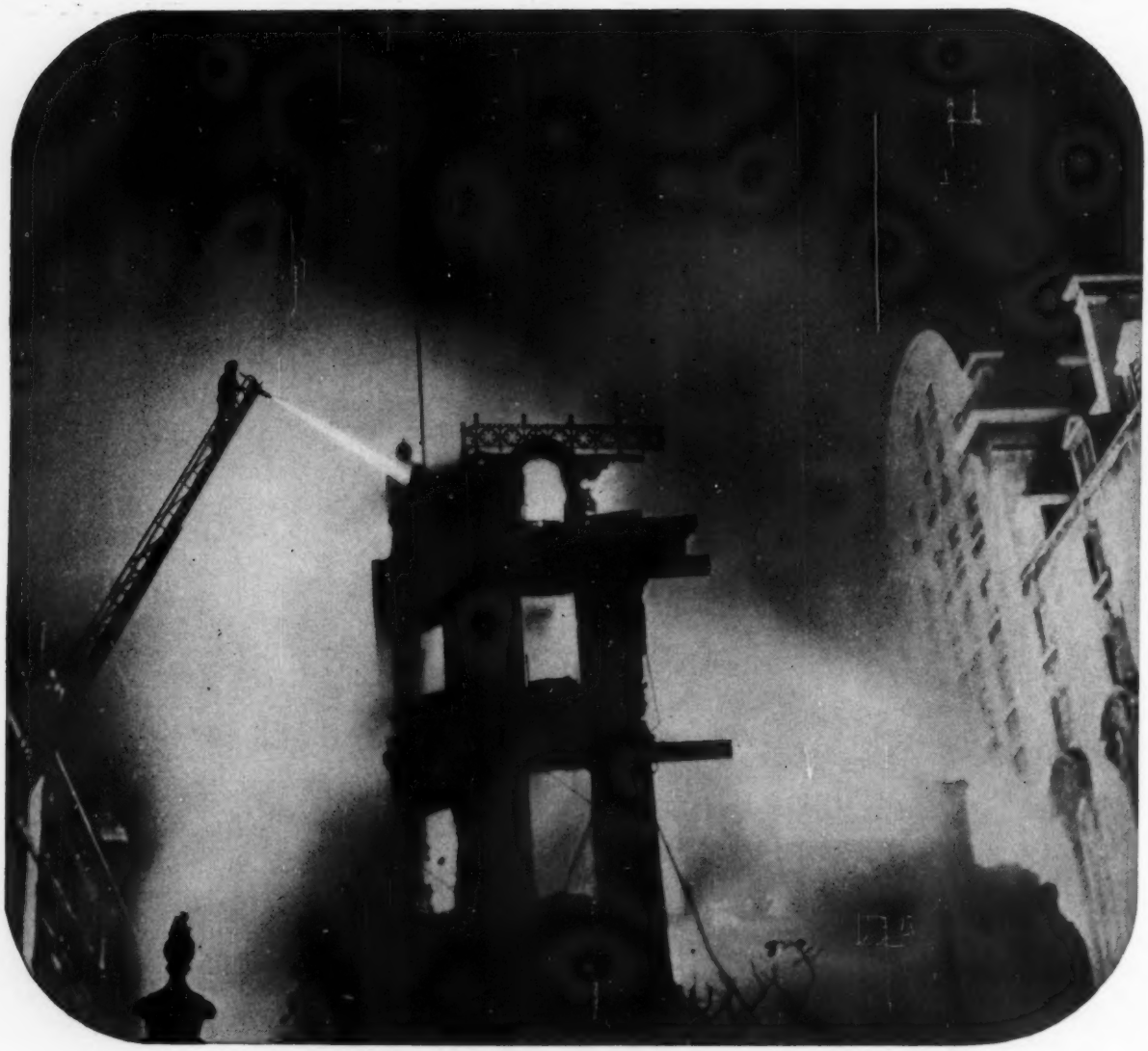

IT HELPED LONDON TO "TAKE IT"

Think of the biggest fire you ever saw and multiply it a thousandfold. Conflagrations like that were common during the great arson-blitzes that threatened London in the terrible autumn of 1940. Never did firemen face such tremendous odds so often.

But London was ready. For months the British had been buying fire hose from America, scores of miles of it built to A.R.P. specifications by the G.T.M.—Goodyear Technical Man.

Day and night that hose took a beating, on pumpers, fire boats and taxi-drawn reels. It was yanked through streets and hauled up ladders, entangled in ruins and buried by debris, but it kept the water coming.

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Paul Cohen, '35

Through the arch of the Natural Bridge in Virginia

VOLUME 44 NUMBER 8

THE TECHNOLOGY REVIEW

TITLE REGISTERED U. S. PATENT OFFICE

EDITED

AT THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY

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From a photograph by Richard W. St. Clair, '36

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LENSLESS

In contrast to the ingenious picture-taking devices described on the opposite page, the camera which made this reproduction of the Rogers Lobby had no lens. Donald M. Fellows, research assistant at the Institute, made this shot by the age-old pinhole method, using a tiny hole in paper-thin metal two inches from his film. Photographically, the lobby presents a difficult problem. Its great height and the short distances available make the use of a wide-angle lens essential if any appreciable portion is to be photographed by a standard camera. A certain amount of distortion may result.

THE
TECHNOLOGY
REVIEW

Vol. 44, No. 8 June, 1942

The Trend of Affairs

Depth of Field

GLANCING up from his book to recognize a friend across the room, a person with normal eyes takes for granted that he will see book, friend, and all intervening objects clearly — in perfect focus. A photographer would give his eyeteeth for a lens which would do the same thing. Actually no eye can do it either; the illusion of a virtually infinite depth of field arises from the ability of the retina and the brain to retain an image and from the fact that, by voluntary and automatic movements of the eye muscles and by random jarrings and movements of the blood, the focal length of the eyes is always and rapidly changing.

For a lens of a given focal length and open at a given aperture, a definite slab in space exists in which objects can be pictured with acceptable sharpness. Objects in back or in front of that region are fuzzy. For a lens of 50-millimeter focal length and *f*/2:8 aperture, a common condition in professional moving-picture work, the depth of field for an object eight feet from the camera is about 14 inches. By various and often undesirable expedients, such as the use of more light or a lens of shorter focal length, the depth of field may be increased, but it remains a major limitation on the photographic arts. An actor declaring love to even an Academy Award winner must keep it confined within the chalk lines marked on the floor of the set or find his efforts slightly blurred. More than is often consciously realized, the inability of the camera lens to sweep like the eye across the stage has channelized the writing, directing, and acting of motion pictures.

Recently two determined efforts to give greater depth of field to the camera lens have received attention. One of these is the so-called IR system. In this method, the space to be photographed is divided into regions, or slabs, each of which is narrow enough to be successfully photographed by itself. Every region is given its own lighting, which is carefully arranged to spill as little as possible into adjoining regions and which is controlled by a separate circuit. A frame of film is exposed, and as it remains exposed each region is lighted up in turn while all the other regions are kept dark. In synchronism with the flashing of the lights, the lens is refocused so that the lighted region is sharply defined on the film. The method, of course, requires artificial lighting. Gas-discharge lamps of the type used in flash photography lend themselves readily to the demands of the system.

The other method is featured by a rapidly vibrating lens which can change the focus of the entire lens system from, say, four feet to infinity as often as 13,000 times a minute. This rapid and precisely controlled motion over a maximum of 0.3 millimeters for a 50-millimeter lens is obtained by electronic means. The lens is designed in such a way that the focus may be changed without alteration of the image size. It is claimed that because the images register so well over one another, the sharp impressions apparently tend to mask the fuzzy ones and that the net result is hence a photograph with great depth of field and acceptable sharpness. The fact that out-of-focus images do register on the film means, however, that the focus, while deep, is not so sharp as could be obtained with a conventional lens over a limited region.

Fifteen Days in a Subway

ACCORDING to Joseph B. Eastman, director of defense transportation, automobiles last year covered over six times as many passenger miles between cities as did busses and railroads combined. But the rubber shortage has cut automobile mileage all over the country, and gas rationing is acting as a further restriction for 9,700,000 passenger cars in the East. With the

limited supply of new cars being carefully doled out and with old cars expected to disappear from the roads at rates variously estimated at from 1,000,000 or more in 1942 to 15,000,000 in the next two and a half years, heavily increased loads for public transport facilities are as certain as taxes.

The decline in the use of the automobile and the increase in industrial activity are creating for transit facilities within cities a similar problem and one of greater magnitude inasmuch as surface trolleys, subways, elevated lines, and city busses carry more than 10 times as many passengers a year as do railroads, intercity bus lines, and airplanes. Mainly because of increased employment, urban transit traffic was already above normal — 1938 — levels before factors reducing automobile travel began to operate to any great extent. Now, with the decline of the private car, authorities predict that in 1942, urban transit passengers will number 20 per cent more than in 1941. Significantly, the passenger load has not yet reached the 1929 peak, although the employment peak has been exceeded by 13 per cent. Like railroads, the city trolley and bus systems have adjusted themselves to an individually motorized America, and although they can still take care of a considerable expansion in their duties, they do not have the equipment, nor, under present conditions, can the equipment be built quickly, to face the complete cessation of private automobile traffic. The usual bus or trolley car ordinarily handles 35 to 50 people, compared to the 1.5 to 1.8 persons normally carried by an automobile, but only an estimated 77,000 public transit vehicles are in operation, and new ones can be built no faster than an A-3 priority can furnish the materials.

For once, the great metropolitan areas will fare comparatively well in a traffic crisis. This relatively good position in the coming crush for standing room may be explained in part by the fact that such areas have always been beset by traffic problems. Before the world's first subway was opened in London in the early 1860's, impatient Englishmen were complaining that it took longer to cross London than it did to go from London to Oxford. Today, with 73 miles of subway and hundreds of miles of surface routes, Londoners have modified their complaints only slightly. As one commentator remarked, "In providing facilities for traffic, cities in reality create facilities for more traffic."

Public transit vehicles are far more economical of road space than are automobiles; a traffic count taken about four years ago in the streets of Detroit showed 3,500 private cars carrying 7,900 persons, and 360 transit vehicles carrying 21,115 passengers. Through sheer lack of road space, therefore, a greater proportion of the population in a large metropolis uses the public transit system than is true of the population in a smaller city. Naturally, public transit systems cannot give as good coverage in the less densely settled areas of small and medium-sized cities. Moreover, the establishment of a large war industry in such cities means a relatively greater disturbance in their traffic load. Cities of less than 250,000 population are therefore experiencing the sharpest increase in public transit traffic.

Large cities are more apt to have rapid-transit systems, which are about the fastest means of moving urban passengers and which are expensive to construct even without the use of the marbles and stainless steel that adorn Moscow's glittering Metro. Without its

F. S. A. Photo by Delano

Accent on the upright — "doors" on a Connecticut tobacco barn open for ventilation

F. S. A. Photo by Delano

At the inspection table — propeller blades being tested for pitch and curvature

incomparable rapid transit, New York could not perform its daily miracle of increasing the number of people in the area south of 61st Street on Manhattan from a resident population of about 630,000 to a working-day population of nearly 4,000,000. New York's 133 miles of subway route have also produced that interesting phenomenon known as the subway commuter who, on the average, spends 10 hours a month underground, the equivalent of 15 eight-hour working days a year.

Volumes of Interest

BY CHARLES H. BLAKE

IT is now pretty well established that the recently completed New England Mutual Life Insurance Company Building is the third "permanent" man-made structure to occupy, in the last 3,600 years, the site of the old Rogers Building on Boylston Street, Boston. The first, a now famous fishweir, is described in detail by Frederick Johnson and others in an extensive report * just published by the Robert S. Peabody Foundation for Archaeology at Phillips Academy, Andover. That this structure served as a fishweir is not proved, but certainly no proof exists to the contrary. We must suppose that a considerable population co-operated in building it, since the portion uncovered in the recent excavation consisted of many thousands of stakes with brushwood between them. These rows, or walls, of wattle extended generally north and south across the whole excavation, which exposed 65,000 square feet of the structure. There is evidence that the arrangement of stakes and wattle stretched farther on all sides — no small undertaking.

Mr. Johnson had the foresight to collect material suitable for examination by specialists in the study of wood, peat and pollen, and mollusks and other living things found in marine deposits. Hence we have the description not only of the structure but, as well, of its surroundings when built and of the subsequent climatic and geologic changes the site underwent. The account sets a high standard to be aimed at by future works on American archaeology.

* *The Boylston Street Fishweir*. xii+212 pages. $2.00.

Great improvement in the human race would be certain, someone has said, if as much attention were given to the breeding of our children as to the breeding of horses and cattle. The path to such a worthy goal is beset with several obstacles, not the least of which is our profound ignorance of necessary, basic facts of human heredity. I think it is not too pessimistic to opine that we know something of less than 1 per cent of the genetic factors involved in the characteristics of a human being. Very often we can say only that the individual is normal in respect to a given factor but not how that normalness is produced physically and chemically.

Some light shows on the eastern horizon. These rays, few but bright, are described in a little book, *New Paths in Genetics*,† by a Sedgwick lecturer of several years ago, J. B. S. Haldane. It is a stimulating summary of the

† New York: Harper and Brothers, 1942. 206 pages. $2.50.

Paul J. Woolf

Cliffs in Zuñi country

relations of formal genetics to biochemistry, embryology, and, to some extent, mathematics. Biologists are now less concerned with the mechanics of transmitting a gene from one individual to another than with the chemistry by which the gene produces its visible effects.

Magnets and Metals

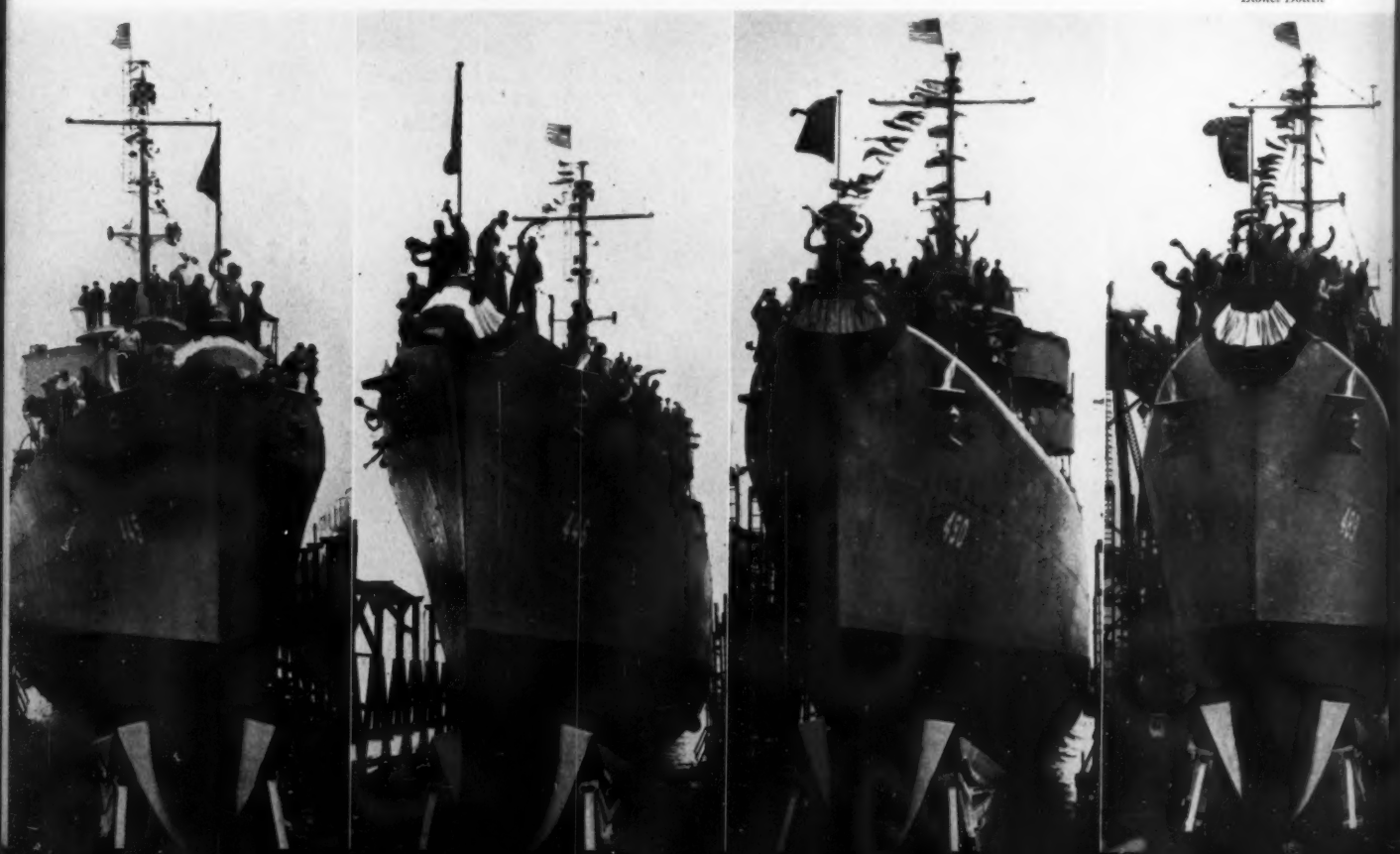
LIKE everyone else who investigates the properties or the structure of physical things, the student of magnetism is brought ultimately to working in terms not merely of atoms but of the electrons within the atom. The magnetic properties of the elements which are basis of his research are due almost entirely to the electrons surrounding the positively charged nucleus of each atom. Systematic variation in the number and arrangement of these electrons occurs throughout the periodic table of the elements, giving rise to corresponding variations in the magnetic properties of the materials represented. Since the distribution of electrons in free atoms is reasonably well known, the magnetic properties of free atoms are fairly well understood.

When atoms combine, however, as in a solid element or in a chemical compound, the distribution of the outer electrons is greatly modified. This shifting of the electron pattern of combined atoms leads to a change in the magnetic properties of the atoms individually and hence to special magnetic properties for them in combination. Many of the other physical properties of matter, such as electrical conductivity, color, and thermal expansion, are influenced by these same changes in electron configuration. For this reason, a study of the magnetic properties of solids can contribute to our knowledge of their structure. From the results of studies of magnetic properties, the investigator can work back in terms of electron patterns toward reasons for the other properties of the substance.

In the magnet laboratory at M.I.T., where Albert R. Kaufmann, '38, Assistant Professor of the Physics of Metals, has been carrying on during the absence of Francis Bitter, Associate Professor of the Physics of Metals, better understanding of the electronic configuration of pure metals and alloys has been sought in the fashion suggested above. In addition, work has been directed toward an understanding of the distribution of atoms in alloys. Individually, the studies are not of great consequence; cumulatively, however, they possess decided importance, as they contribute to knowledge of the state of electrons in a solid material. The alloys investigated range from ordinary systems such as iron in copper to unusual materials such as tantalum in nickel, and iron in the rare-earth metal cerium. Nickel alone is about one-third as magnetic as iron. Adding tantalum to it, thus stuffing in a foreign atom and modifying the configuration of the nickel atoms produces a far less magnetic alloy. When the tantalum addition reaches about 20 per cent, the alloy is no longer magnetic. (*Concluded on page 426*)

A new world's record in the launching of destroyers was set in the yards of the Federal Shipbuilding and Dry Dock Company at Kearny, N. J., on May 3, when these four destroyers went down the ways in 50 minutes. The parade to the water began at 11:40 a.m. when the U.S.S. Fletcher *(No. 445) was launched. Fifteen minutes later, the U.S.S.* Radford *(No. 446) followed her sister ship on the same wide way. Twin destroyers on a neighboring shipway then took to the waters of the Hackensack River: the U.S.S.* Quick *(No. 490), which slid from dry land at 12:15, and the U.S.S.* Mervine *(No. 489), which at 12:30 terminated the procession of new sea power. The M.I.T. is especially interested in this achievement: Gordon G. Holbrook, '10, is general superintendent of the yard, and Charles Edison, '13, Governor of New Jersey and former Secretary of the Navy, was the principal speaker at the launching.*

Lionel Dottin



Building Air Power

The Army Air Program, in Constant Vigorous Growth, Envisions Balanced Forces Based on Tactical and Strategical Principles

By Oliver P. Echols

Alumni Day Address

ONE of the greatest military advantages of the aggressor nations is that they plan their aggression years in advance. They have the advantage of the initiative. They know what nations are to be their enemies, and they choose the time and place of the fight. In designing their aircraft, the Germans thus knew their problems: They were to attack Poland, France, Russia, and, subsequently, England from continental bases. The Japanese also knew their problem and planned the execution of it extremely skillfully, within the limits of their resources.

Officers of the United States Army Air Corps of my generation were firmly convinced for many years that the next war would, to a large extent, be an air war. It was a long, hard road to convince our people that aviation had the reliability, mobility, and striking power which we believed it possessed. To sell the idea of air power was difficult, but with such meager funds as we were able to obtain for the Army Air Corps we plugged away at the development of those types and models of military airplanes which we believed were necessary for use by a well-rounded air force in the war which was to come. We developed high-altitude pursuit planes for the interception of high-flying aircraft, medium-altitude pursuit planes for operation against bombers and for support of ground troops, light bombers for support of ground troops, medium bombers for the battlefield bombing and the defense of the shore line, and heavy bombers for long-range, strategical operations. We planned a balanced air force based on tactical and strategical principles. Our object was to build *air power*. We did not know when the next war was coming or where our airplanes were to be used, but we knew that modern military airplanes could not be designed and produced overnight. Their complexity is such that two years' work is required on a large one. These airplanes had to be ready for production at the beginning of the war, or else it would be too late.

Let us see how sound our thinking was in this respect: In France and later in Libya and Russia, where great ground armies with their mechanized forces were locked in a death struggle, the requirement has been for pursuit planes, light bombers, and medium bombers. The army which has lost control of the air has lost the battle. In the Philippines, Singapore, and Java, the results of failure to maintain air superiority have been seen. During the spring of 1941, after the Germans had been neutralized in their air assault on England, the British began to think of the offensive. What could they do? Bomb Germany! How? The American heavy bomber. Immediately there came a demand for a very large number of heavy bombers, which must be supplied immediately. This request, of course, could not be filled at the time, but fortunately the United States then had started production on two types of very superior four-engine bombers.

Much criticism has been heard concerning American airplanes. This criticism is not justified by the records. Combat airplanes are designed for specific missions. There is no such thing as an all-purpose airplane. Such a machine would not perform any mission well and would be an easy prey in combat. When an airplane is assigned to a mission which it was not designed to perform, it is at a disadvantage. A number of instances have occurred when American airplanes have been put to uses other than those for which they were intended. In England, Russia, Libya, the Philippines, China, and Java, however, I know of no case where American airplanes have not been able more than to hold their own with the best the enemy has had to offer. This is only a beginning, as our best airplanes are just now starting to roll off the production lines. I believe that coming events will soon convince the American public that, taken as a whole, the best combat airplanes in the world are being produced here.

We now have in production two high-altitude pursuit planes — the Republic P-47 with the 2,000-horsepower Pratt and Whitney air-cooled engine, and the Lockheed P-38, a small twin-engine interceptor equipped with two Allison liquid-cooled engines. These airplanes are heavily armored, are equipped with leakproof tanks, and carry offensive fire equal to that of any pursuit airplane of any other nation. Equipped with turbosuperchargers and having speeds in excess of 400 miles an hour, they can fly higher and faster than any other pursuit planes in the world. Our medium- and low-altitude pursuit planes, the Bell P-39 and the Curtiss P-40, designed for the support of ground troops, are giving a splendid account of themselves on nearly every battlefield of the world. American medium and light bombers, such as the Martin B-26, the North American B-25, and the Douglas A-20, are the fastest airplanes of their type in the world, and in our heavy bombers we have two models — the Boeing B-17 (Flying Fortress) and the Consolidated B-24 — which will fly higher and faster than any other heavy bombers in the world. The Boeing B-17's, with their superior performance and powerful defensive turrets, have proved in the East Indies and

United States Army Air Corps

Basic training planes ready for the takeoff. This long line of machines illustrates the efficient group methods in use by the Army in its expanded pilot training program.

the Philippines that they can outrun and outfight the best Japanese pursuit planes. These are, in general, our production airplanes. I repeat that they are second to none. Other and better planes, in each category, are in the experimental shops, and some of them are already on the production lines.

When Germany was building up her air force in 1934, the United States Army Air Corps had less than 1,450 planes and 1,500 officers, and four years later, at the time of the Munich conference, the Air Corps had only 1,773 airplanes. In spite of the President's efforts to build an air force, not until the fall of France were the people of the nation sufficiently aroused from their complacency to demand that the United States become an *air power*. The Air Corps was given funds for 3,000 planes in June, 1940, and for 18,000 planes in September, 1940. The latter date — September, 1940 — is the beginning of the American effort to become an air power. We were given approximately two and a half billion dollars and told to build an air force overnight. With an industry which had been on a starvation diet all of its life and had never been called upon to build more than a few hundred airplanes a month, a large percentage of them commercial, we were expected to place orders and begin to produce thousands of combat airplanes immediately. Because of the well-made plans of the War Department and the patriotic attitude of the aircraft industry, we were able to place orders for this entire amount within less than two months from the time the funds were authorized. Immediately we were subjected to a vast barrage of criticism, however, for having so many airplanes on order and so few on hand. Germany had taken six years to build her air force, but the American public had apparently believed that we could turn appropriations into airplanes overnight.

The 21,000-airplane program was just the beginning. It was immediately increased, as the President had set a goal of 50,000 airplanes a year for the Army and Navy. This objective, heretofore considered impossible, was in sight. It was quite an accomplishment. Then came Pearl Harbor. The whole military strategy of ages was changed at once. America had been hurled into a global air war. The President declared last January that we would produce 185,000 airplanes within two years and that in 1943 we must reach a productive rate of more than 10,000 airplanes a month. This was an entirely different problem. It called for a complete resurvey of the national economy with reference to labor, management, materials, and machine tools.

In our initial expansion program, we relied almost entirely on the aircraft industry. Plants were built, management was thinned out, labor was trained, new machine tools were procured, and the aluminum and magnesium industries were expanded. Although the aircraft industry responded in a magnificent manner, the fact soon became apparent that management would become a serious problem in any further expansion, and that in the event of a real emergency, involving our entire industrial effort, the great automobile industry would have to be relied upon to carry a large proportion of the aircraft load.

With the assistance of William S. Knudsen, lieutenant general, United States Army, and George J. Mead, '16, of the National Defense Advisory Commission, the War Department undertook to bring the automobile industry into the aircraft production program. Started in the summer of 1940, the conversion progressed slowly at first. It was no easy problem for the aircraft industry, the automobile industry, or the War Department. Manufacturers inexperienced in airplane production had to be told the know-how of building aircraft, aircraft engines, and aircraft accessories, of which many were new and untried and for which the engineering drawings and data had frequently never gone beyond the experimental shops. To get the necessary engineering data from the aircraft manufacturer to the automobile production line has not been an easy problem. Further, there have been, and still are, certain honest differences of opinion, based on different experiences, as to the best methods and procedures. The aircraft manufacturer works in soft materials; the producer of automobiles, in hard materials. The aircraft manufacturer has become accustomed to change, with his series of small orders each necessitating alterations and improvements. Often being required to go into production on an unproved article and having to remedy defects in the production line, he has become nimble, alert, and versatile. He is not easily discouraged; he is a pioneer, with imagination and a willingness to try the impossible. It is greatly to the credit of the aircraft manufacturers that, despite the tremendous load of their own, they have turned over their designs and spent unsparingly of their time in assisting in the conversion of other industries. (*Continued on page 382*)

Beyond Victory

In All Life, the Strength to Maintain What Has Been Secured Is an Imperative Need; Lessons from the Past Stress This Necessity in the Present

By Karl T. Compton

ADDRESS TO THE CLASS OF 1942

THE time has now come when I have conferred upon you the degrees to which your diligence in work and study has entitled you. The phase of life that for you is thus closed is always a critical one. To each individual here it has doubtless been marked by experiences that are likely to prove memorable in your lives whether those experiences have come from contact with your teachers or with your fellow students or with others, but to all it must be memorable alike for the happenings within the Institute and the mighty doings outside. . . .

All who have watched your doings have testified that you have acquitted yourselves well, but such activities, important as they are for you, for the Institute, and, in so far as Technology influences the life of the country, for the nation as a whole, are, of course, overshadowed by the one great incident of our day and generation, the war. We are all gratified to know that here, too, in so far as you have yet had opportunity for action, you have acquitted yourselves well. Practically universal has been the readiness to serve, to put aside all selfish considerations and to acquit yourselves like men in a crisis that puts the moral fiber of all to a real test. . . .

On you is the burden but also the privilege of contributing to the successful prosecution of this war and to the great reconstruction that will inevitably follow it. You have had the right kind of training to make you useful both in war and peace. In the class rooms and laboratories your training has been primarily scientific and the best permanent possession that you can have acquired as a result of that training is a real appreciation of the spirit and the method of science, the insistence on facts, however ugly, the need of foresight and of orderly procedure, the insight into the vast resources of nature and the realization of the dependence of man's progress towards evil or towards good on the mastery of those forces.

Of this you have learned at least a part, but you have learned more. You have learned from intercourse with unselfish and highminded teachers, and possibly even more effectively because more unconsciously from association with your fellow students the need for more than science and more than efficiency, the absolute duty of regard for other people and the willingness to serve them when you can. There is nothing unscientific in this.

There is no ground for the antithesis so often set up between science and humanism. Superficial people talk today of German inhumanity in the conduct of the war as if it were due to scientific education. They even use this as an argument for the revival of classical learning in our schools, forgetful of the fact that there is far more study of the classics in German schools than in America. The fact is, of course, that sympathy with others, which is the basis of what we call humanity, goes far deeper than any such learning as either Greek or chemistry. All educational systems wherever maintained must foster this sympathy and happily there is ample evidence that it is found at Technology in ample measure.

Most heartily do I congratulate the graduating class on the fact that so many of its members have throughout their career here shown a willingness to put self aside and to serve their fellows in a manner that is beyond all praise. The man with the right spirit finds for himself the opportunity for service and many such opportunities have been found in the realm of Technology during your residence here. And now comes the far greater opportunity that none can fail to see and I doubt not that many of your number are ready to give the last full measure of their devotion to the great cause. It is the cause of freedom and of humanity in which we as a nation have enlisted in a spirit of chivalry that must bring out the best that is in us. Let there be no slackness of will nor flabbiness of sentimentality but a manly devotion to high causes at whatever cost. . . .

Whether you go into the fight or not, whether you be active or inactive, in the reconstruction that will follow the war, you who go out into the world now cannot avoid contributing something either to the success or to the failure of the mightiest struggle in the history of the world. It is, therefore, with no ordinary emotion that we see you go, with the hope and expectation on the part of the Corporation, the Faculty, and the alumni that you will prove worthy of the Institute that, through your graduation today, you are henceforth entitled to represent.

MEMBERS of the Class of 1942, the charge which I have just given you is not original with me and was not prepared for you. You have not heard this message before, since it was delivered three or four years before most of you were born. Some of my colleagues now on the Faculty and the Corporation heard it then, and as I read it I wondered whether it took them back 25 years to another commencement when my great predecessor, Richard Cockburn Maclaurin, in these same words addressed the first class to be graduated from Technology during the last World War. Quite probably some of the very young men to whom he gave this message were your fathers, commencing, as you do now, their careers in a world at war. I have quoted his address verbatim, except for the omission of six sentences and the change of two words.

I could not better this charge. The fact that it is as appropriate today as it was then proves its fundamental truth. But there is significance in the fact that only 25 years after the war to end war, we are again engaged in a World War more far reaching than the last. So let me supplement President Maclaurin's charge only by calling attention to some lessons to be drawn from the fact that the same desperate conflict of ideologies, war, and destruction has to be faced twice in one short generation.

Some people have become discouraged and cynical over the failure of the last great struggle, with its sacrifices and its hopes, to achieve enduring peace and

security. The war of 1917 was, for America, a real crusade, and the slogans, "To make the world safe for democracy" and "The war to end war," expressed the deep, unselfish purpose of our people. Today, it seems to me, our attitude toward the war has less of the crusading spirit, less of the enthusiasm of chivalry. As compared with 1917, 1942 is characterized by more grim determination, more efficiency, a more realistic attitude. Certainly the peril to our own country and its ideals is greater now than then. Part of today's grimness arises from this peril and part, I think, from the disillusionment over the failure of the last war to end war and to make the world safe for democracy. We now know that simply winning the war, as we did 25 years ago, is not enough to achieve permanent security. With all its effort and sacrifice, this war will be only a first step toward the goal which is desired.

You will recall that President Maclaurin said: " . . . The best permanent possession that you can have acquired as a result of that training is a real appreciation of the spirit and the method of science, the insistence on facts, however ugly, the need of foresight and orderly procedure. . . ." As I see it, the last World War was an experiment — on a huge scale, to be sure, but nonetheless an experiment. We had a theory, and we acted in accordance with that theory, but we did not accomplish what we hoped. This is a fact, an ugly fact, which we should face honestly in the spirit of science in order that our next attempt may avoid the earlier mistakes and profit by the earlier lessons.

Viewed in the spirit of science, cynicism and despair are replaced by faith and encouragement. For in science, no experiment is ever a failure; it may not yield the results which were hoped for, but it always yields new knowledge and experience which can be profitable if intelligently evaluated and made the basis of further effort. To strengthen and guide us as we again begin a fresh effort to defend the right of free men to live and work unmolested and unafraid, let us look at some of the knowledge gained by experience during the past 25 years.

The first fact is that democracies can win. We hear much about the inefficiency of democratic government; we see many evidences of lack of consistent planning and effort, and many evidences of slowness of public opinion to crystallize. In these respects a Kaiser or a Führer leading a regimented people to strike the first blow has an initial advantage. But the record of past events shows that democracies have more than held their own in war, as also in peace and in standards of living. *Why* this fact is true lies in the realm of hypothesis, but we believe it is because people who exercise the rights of self-government, people who depend on their own free choice in what they do and how and where they do it, people who are trained to take responsibility are in the mass more powerful than those who are driven by the boss or who follow the leader. The morale of free people is better able to stand strain, their reserve strength is more profound, their leadership extends clear down into the ranks.

A second fact is that democracies are paying a terrible price now, as they did in 1917, for their unpreparedness to meet an armed aggressor. Our dislike of war and our wishful thinking led us to refuse to take even elementary precautions in the face of an increasing series of acts of international aggression by Japan and Germany, which we knew to be straining their utmost to build invincible military power. For example, Congress refused to permit the fortification of Guam because the people back home had their hearts set on peace and remained blind to the fact that Japan was fortifying the surrounding islands with feverish speed. Moreover, only a year ago, a demonstration of antiaircraft firing had to be planned with greatest care because of lack of ammunition. Furthermore, high governmental officials, unwilling to face the possibility that our rubber supply might be cut off, compromised on halfhearted steps. Now we are again paying the penalty in confusion, loss, and defeat while we suddenly wake up to the realities of the situation and strain every nerve and every dollar to make up for lost time. We *are* making up for lost time. The war effort is now proceeding at a pace which would have been deemed incredible a year ago. We have good reason to expect ultimate victory, but our initial unpreparedness is giving us a heavy handicap.

A third fact — and this lesson is by far the most significant — is that victory is not enough to secure the goal for which the war is waged. We fought the last war to make the world safe for democracy; we won the war, but democracy remained safe only for as long a time as was required to rebuild an aggressive military power aimed at achieving national ambitions at the expense of other peoples, by threat of force if possible and by actual force if necessary. Looking back over the past 25 years, let us consider where we failed and what we might have done to succeed.

We in America, who had sacrificed so readily to win the war, became suddenly and strangely unwilling to cooperate in maintaining the peace. Our sabotage of the League of Nations places squarely on us, in my judgment, the major responsibility for the world mess today. For two years we had played our world role with crusading spirit and missionary zeal, and then suddenly we crawled into an isolationist shell except for purposes of profitable trade. I hope we have learned the lesson that we can no more avoid a share of responsibility for world events than a citizen can shirk his share of responsibility for the government of his city; at least we should now know that if we shirk this responsibility, we nevertheless cannot escape the results. When another chance comes to live in a world at peace, we shall be well advised to do our part in managing world affairs.

We have likewise been too prone to think that when a war is won, a treaty is signed, and an organization chart is set up to implement our purposes, the objective is then secure and needs no more attention. If, here and abroad in the last 20 years of peace, we had devoted to the task of making democracy work even a fraction of the thought and sacrifice that we devoted to the fight to save it, I believe we should not now be fighting to save it over again. Perhaps we could have made democracy work even in Germany in the 1920's had we put into that job one-tenth of what we are now spending to save our own democracy from the ideologies that arose out of the ashes of the failure of Germany's democratic attempt.

(*Continued on page 390*)

Louis Rosenblum, '49

Prospects and Retrospects

From Each Ending, New Beginnings Are Made; This Principle of Evolutionary Change Is Fundamental to Progress

By Samuel C. Prescott

COMMENCEMENT ADDRESS

IN the 48 years since, like each of you, I was a member of the graduating class about to receive the diploma of the Institute, I have seen many successive classes enter, carry on their four years of undergraduate work, and then, as fellow Alumni, depart from the classrooms and laboratories, and scatter throughout our country and the world to make their professional careers in science and engineering. Of these many thousands of men, you constitute the last class to depart during the long period of my staff tenure, and thus, as graduating class and retiring professor, you and I are in a limited and unofficial way celebrating a commencement together.

As "commencers," to use the ancient English university term, we have each merely completed one definite stage in the journey of professional life and now pause briefly before setting out on the next phase, where we may utilize and apply the training already gained, and where, if we are wise, we shall continue to seek new knowledge. For nearly four years you and I have been what St. Paul would have called "parts of one body," individual units in the same great organization which we proudly call our Institute of Technology. In different ways we have each in some degree shared functions of learning and teaching, of laboratory work and research, of theory and practice in our respective fields. Each has taken part in various other aspects of our scholastic and extracurricular activity. We have been individual corpuscles in that blood stream of pulsating life which has daily coursed through Technology's arteries, corridors, and passages, and circulated to classroom, library, and office. Thus we have in some measure shared Institute life together and have learned much of its purposes and its high ideals. Some of you I have been fortunate to know

as my own students or as sons of former students; some, in other ways. Now the particular type of association which each of us has had with the Institute is about to terminate, and for you as Alumni a new, important, and permanent one will begin. We end a definite era in our experience — you because you have successfully and honorably completed the requirements for your degrees and will henceforth represent Technology in a professional way, and I because the hand of time cannot be stayed.

Since most of your life is in the future and most of mine is in the past, I venture to speak to you briefly and simply on prospects and retrospects. Carved in the enduring stone over the fireplace in President Compton's office is a Latin inscription, *Alia initia e fine*, which may be freely translated, "Other beginnings arise from each ending," or, less cryptically and more generally, "The conclusions reached as each problem is apparently completed provide a starting point for new developments and more far-reaching experiences."

The theorem here stated is as true today as when first expressed hundreds of years ago. Its broad significance and numerous implications, whether in the normal course of the affairs of life, or in sudden and cataclysmal happenings which may be either progressive or retrogressive in their final results, are too obvious to demand extended exposition. In simple phrase, one step leads logically to another; one discovery opens a new world. As the results of research make new advancements possible, the principle is true in science and engineering; it is true in the evolution of social and economic processes and in national affairs, as should be recognized by social and political reformers who would make radical changes without deep and adequate thought. Furthermore, it is true in the personal and professional life and progress of the individual.

In our own fields of interest, you well know the great success and rapid development of science. New technological applications are due to the fact that the scientists and engineers whose works are marked by real distinction have been and are continually building upon previously laid foundations of proved stability. Science does not advance by revolution and by tearing down the existing structure of what is believed to be truth, but by testing, proving, and remodeling after thorough and constant re-examination of current theories, and by making new additions to our knowledge through research. As technical graduates you should continually keep in mind that your professions are not static but progressive, and that the ways of doing things and the things to be done will change with the passage of time. Basic principles will remain unaltered, but new knowledge and new techniques and new arts will continually advance your professions.

If you are to keep in step in the forward march and to attain leadership in your field, you will observe carefully, study deeply, and learn humbly. Experience shows the certainty of this prospect for you, as we look back over the rapid developments and advances which have occurred in the fields of science, engineering, and architecture even during the short period of your lifetime. Recognizing this principle of evolutionary change, a major part of our business as scientists, or engineers, or men entrusted with management of affairs is to see that the new undertakings in which we are concerned are based on historically and scientifically sound premises, are logically planned, and are honestly and efficiently executed.

Having reached an end of your discipline in formal studies, you are now prepared to acquire and to enlarge the experience which will transform you from students into professional engineers or scientists in your chosen fields of activity. Your diploma will serve as your passport and one of the credentials admitting you to new duties and larger responsibilities. Other equally important attributes are the strength and stability of your character and the quality we call your personality, which includes your co-operativeness or ability to work harmoniously and effectively with other men, whether superior or inferior in rank. These qualities are essential if it is your ambition to make your life useful and successful in a broad way, rather than self-centered and unregardful of others. (May I here interject the statement that you can often learn much from the common workman who may be under your supervision and greatly your inferior in general intelligence, but who knows how to do his own job well.)

I am using the terms "prospects" and "retrospects" in the plural forms because the words may have several different shades of meaning. As prospects we may not only consider "the immediate view within sight of the eye," as the dictionary has it, but that more comprehensive and forward-looking mental vision in which imagination and ambition, as well as a survey of the probable course of events, may enter into the picture. We might call such a long-range view a planned anticipation of a program for the future, based on present knowledge of facts, a predilection for a special field of professional activity, and preparation and adaptability for it. As a student your choice of a Course was a first great step in such an organized program. That unforeseen circumstances may require minor or even major changes in a plan of your future is almost inevitable, but what I wish to emphasize is that a clear purpose in life adds materially to the probability of definite accomplishment.

Another definition of prospects is permissible, namely, our presumptive expectations of personal success and of rewards in a material sense, which may be partially assured as a result of inherited relationships or connections that have already been established. In the consideration of the prospects of individuals in a group such as you constitute, both shades of meaning must naturally be employed and should be taken into account as you ask yourselves or others the question, "What are my prospects?" My general answer to such a question would be that your prospects in a material and professional sense will be largely determined by your integrity of character and native ability, the excellence of your training in discipline, skill, and imagination, the sense of team play and breadth of vision you have acquired, and your persistence and self-reliance in attempting to realize your hopes and ambitions.

To be sure, time and chance will often make changes in any long-time program we now lay out for ourselves. Fortunately, we cannot foresee all the surprises, changes, and vicissitudes that time may (*Continued on page 394*)

The Course Is Clear

Problems of Economic and Industrial Readjustment to Be Foreseen in Years after War Promise Wide Demands Upon Science and Technology

By Leverett Saltonstall

BACCALAUREATE ADDRESS

WHEN Harvard University was looking for a President shortly after the Civil War, it came to Technology and found a young Professor of Analytical Chemistry and Metallurgy, Charles William Eliot, who became president of the university in 1869 and remained through many very important and formative years.

Dr. Eliot built up a great record and he lived a long time. When he reached the age of 90, Harvard wanted to give him some kind of celebration. Dr. Eliot said he would be glad to have a celebration provided it did not take the form of an obituary, and so a very fine day was planned, full of different kinds of events. I shall always remember that day because I was at the time treasurer of the Harvard Alumni Association and, as such, had a very small place on the platform at Sanders Theatre that afternoon. After a few preliminary songs and talks, the whole front of the stage was emptied. Presently, Dr. Eliot walked forward. He was a man perhaps six feet two or three, and he always stood very erect. As he walked to the front of that stage, where there was no rostrum but just empty space, he was an impressive figure. He said, in starting his talk, "I am going to commence what I have to say today with the same words with which I opened my inaugural message to Harvard University in 1869." These words were those of Edward Everett Hale:

> To look up and not down,
> To look forward and not back,
> To look out and not in — and
> To lend a hand.

The whole occasion, with its emotional significance and that fine figure of a man over 90 years old with a great record of achievement behind him, was one that I have never forgotten.

It seems to me that those words of Edward Everett Hale apply today in these difficult times as they may have applied in 1869, when Dr. Eliot became president of Harvard University. Then we were just over a war; today we find ourselves in a terrible war in which the whole world is engaged. In such troubled times as these, a speaker at an occasion like this often declares that it is difficult to know just what to say. Perhaps it is difficult if he goes into details, if he tries to work out exact plans for the coming years. But certainly, as I see the course ahead of the Class of 1942, it is a clear one. It is clear for the immediate present, and it is clear also for the time a little way off. It is clear for the present because you have a victory to win for this country and for the United Nations. This is a total war — it is a war in which every one of us is engaged. But it is upon you, the men of your age, the men who have been graduated from such an institution as this — of which Massachusetts is so proud — that we must depend for a vic-

Federal Works Agency—Section of Fine Arts

Conversion of men and material to the works of peace — such as this mural by William Gropper in the building of the Department of the Interior depicts — will be a major task for science after Armageddon.

tory. We can equip you with arms; we can equip you with wisdom; we can equip you with scientific knowledge; but it is upon you as individuals that we depend to keep our way of life as we know it in this country for us and our children and your children.

Cardinal O'Connell, perhaps the leading citizen of Boston today, said in an Easter message: "The defense of our altars and our homes is an obligation which rests upon every citizen. The founders of this, our beloved nation, were ready to offer whatever they possessed, even life itself, to maintain the sacredness of their civil rights and their religious freedom and we know that Americans, today, are no less determined to maintain, with God's great help, our land, our territory, our homes, our altars and the precious inheritance of our American way of life."

Now I say the present is clear. I think of how I felt in 1917, when I was a member of the Harvard University Law School, and of the attitude of our class at that time. Toward the first of the year we were uncertain. Everyone was asking the other had he got a job yet and where was he going to work and where did he think the best place to go to work was — what city and so on. And then in the spring of 1917, all that talk stopped. Many of my class immediately went into one of the Plattsburg camps in 1918. The rest of us finished our courses, were graduated, and went into other camps in the middle of that summer. No question arose in our minds at that time as to our course for the next couple of years. No question arose as to what kind of a job we were going to get or in what city it was best to keep that job. The same is true today with the Class of 1942: As I see it, your job, your future, your immediate future are clear. You have your country and you have a victory to win for that country in whatever line it takes — and yours is a scientific line. In these days of scientific quest which involves your safety and our victory, there are many, many ways in which you can now be of immense value to your country.

When we look at the future, after this war is over and victory is won — and that is the only way we can look at the future, that we will win a victory — then it seems to me our course will become a clear one. If we look after victory upon what this world will be, we shall see the need for a tremendous amount of scientific knowledge. After victory, we are going to see this country with more mechanical equipment and more machinery and more knowledge of science than it has ever had in its history. That science will be geared to war uses and must be turned to the purposes of peace.

That conversion is necessary for many reasons. It is imperative if this way of life of ours is to go on. It is necessary if we are going to find jobs for our people. I have thought many times in the past few months of the problem of jobs for our people here in this state, and our way of life can go on only if we find them jobs — and jobs in private industry. Today think of the thousands of men who are engaged in war industry. Think how the plants have enlarged for war purposes. Think of the fact that approximately 28,000 men are now employed by one industrial organization in Massachusetts, whereas that company ordinarily employs only about 14,000 men. Here are 12,000 to 14,000 men who might find employment elsewhere in peacetime, men who have acquired a knowledge of mechanical contrivances, men who want to work and bring up their families and continue to live in Massachusetts. For those men, opportunities of work in peacetime must be found. For that task, they must turn to men of science like yourselves, men who are capable of converting instruments of war into instruments that will make peacetime goods and materials for the layman. It seems to me that after victory is won and you have done your part in winning it, the future is also clear in its general outline.

Recently, when Boston University gave him an honorary degree, Francis Biddle, Attorney General of the United States, spoke in Boston, and what he said appealed to me a great deal. He said this, in part: "Must we lose when peace comes the directness and ferment which come with the breath of war? . . . One of our major problems, when the peace comes, is to learn to use, to live in, the immense productive machine which for the war purpose we have built up. We must have minds bold enough to accept this new economy of plenty, an imagination sufficiently fertile to devise ways of gearing the machine from war to peace, of retooling our capacity from war to peace, just as we are now completing the process of retooling from peace to war." That task which Mr. Biddle has defined will become the job of men of science such as yourselves.

Then, too, when victory is won and this war is over, we shall have a much smaller world in which to live. Think of the airplane, the radio, the telephone, and all the other means of communication that are now becoming more and more scientifically perfect. Think of the recent trip of General Marshall and Harry Hopkins from this country to England and back again in an American bombing plane. Not long ago I had a commercial agent of one of the large airplane companies come into my office to give me some of the ideas with which his company was working. Its imagination is running far enough ahead to make week-end trips to Paris seem not beyond the realm of possibility when this war is over. Think of the contrast with the present. Dr. Compton spends a week end in New Hampshire, and I consider I am going quite a way if I go 20 miles outside of Boston. And yet Paris is not beyond the realm of possibility. If we can go across the ocean in 24 hours, we can fly to the continent of Europe and come back again the same week end.

We are going to have a smaller world, and this fact means that the competition in science is going to be more acute and that we shall have more opportunity for men of your character, men of your training. The future, as I see it, is hence reasonably clear for the Class of 1942.

What kind of thought should be in your minds at a time like this when you are starting your career? As I said, those words of Edward Everett Hale appeal to me enormously. First, "To look up and not down." Today we need more spiritual faith. Men and women today have greater spiritual emotion. They have that because they are uncertain of their own future and so they turn to the higher emotions, to the better emotions that are within them. Today when we look up and not down, we want to keep our ideals in this (*Continued on page 404*)

THE INSTITUTE GAZETTE

PREPARED IN COLLABORATION WITH THE TECHNOLOGY NEWS SERVICE

A War Class Become Alumni

Early Commencement and Alumni Day Are Occasions Marked by Appreciation and Unity

"FIGHT hard. And remember you will have your men to look after." Bringing this charge from the Class of 1917 to the Class of 1942, Edward Pennell Brooks, '17, speaker for the 25-year Class at the Class Day exercises held on Alumni Day, April 25, set a keynote which was echoed often during the ceremonies surrounding the expedited graduation of another group of Technology seniors to go from the Institute into a world at war. This is not to imply that Alumni Day, baccalaureate Sunday, and commencement day were a somber series. Rather, the entire occasion, favored as usual by the best of weather — fair skies and a pleasant breeze — seemed to be marked by good cheer and an appreciation of familiar things which was even deeper than is customary. Alumni Day this year was celebrated some six weeks earlier than usual, because of the accelerated graduation necessitated by war. The program itself was shortened by the omission of various traditional events. But the spirit of the occasion was stronger than ever. Wide appreciation was expressed for the readiness and smoothness with which Raymond H. Blanchard, '17, chairman of Alumni Day 1942, and the committees working with him had adjusted matters to the new conditions.

S. Young Tyree, Jr., of Falls Church, Va., chairman of senior week, opened activities on Saturday afternoon with an address of welcome to the Class Day guests, who filled Morss Hall in Walker Memorial. As arranged by the senior Class Day committee comprising Carthrae M. Laffoon, Jr., of Irwin, Pa., and Thomas T. Crowley of Cambridge, who worked with the Alumni Association committee composed of John D. Mitsch, '20, chairman, Eugene Mirabelli, '19, Charles F. Park, '92, and Raymond Stevens, '17, the program went according to schedule through familiar episodes.

. . . *For 1892* . . .

Harry J. Carlson, '92, speaker for the 50-year Class, was introduced by William R. Kales, President of the Class of 1892, and drew on his own undergraduate days for comment on the present, saying, in part:

. . . There were queer times in the early Nineties: We were in a deep depression. Melons in the Midwest were ten cents a bushel, but no one had the dime. Labor was seventy-five cents for a 10-hour day, but no one had the money to pay even this depression price. It was just after the days when William H. Vanderbilt was supposed to have said, "The public be damned!" And at least the capitalists of that day acted as though everything were theirs, whereas now the wheel has turned so that capital seems to be damned and labor to be in the saddle. Of those days it was said that any fool could make money (and we did), whereas now it takes a Technology graduate to make even a living. . . .

M.I.T. Photo

Presidents await the beginning of Class Day exercises. Dr. Compton chats with B. Edwin Hutchinson, '09, President of the Alumni Association, and Jerome T. Coe, President of the new accession to alumni ranks, the Class of 1942.

M.I.T. Photo

Harry J. Carlson, '92, speaker for the 50-year Class

M.I.T. Photo

Raymond H. Blanchard, '17, chairman of Alumni Day 1942

Ours has been an active Class. The year after graduation, 15 of the Class were enrolled on the teaching staff of the Institute. Since then, at least seven members of the Class have been Heads of Departments in Technology or other similar schools. At least eight more have been full professors — one has been chairman of the Faculty at M.I.T. Three members have been presidents of the Alumni Association. Two have been life members of the Corporation, and two have been term members; two are still on that body. Outside of education, I might mention our number as including the President of one of America's large corporations, a Vice-President of one of America's most important railroads, a great engineering builder, an author of worth-while books, a general in the United States Army, and a director of a large and growing technical school. The President of my Class has just completed one of the largest war buildings in the world, covering as it does 60 acres of ground; that is, it puts under one roof an area larger than that from the Embankment to beyond Vassar Street and from the President's house to a quarter of a mile beyond Massachusetts Avenue. And the past President of the Alumni Association tells me his company is building one that is even larger. . . .

You may think that these are troublous times to start out in the world, but all these troubles will pass. You are graduated not as engineers or chemists or architects but as United States citizens, pledged to make the best use of your natural gifts and your acquired knowledge to keep this country and the world at large a safe place in which sensible people may live. In order to do this task, you must help one another. . . . This is a good rule to remember: Help one another and you help yourselves; thus when you are the 50-year Class you will look back happily and still full of courage — for with you then as with us now, life begins at 70!

Transfer of the class ring by Jerome T. Coe of Madison, Wis., President of the Class of 1942, to S. Richard Childerhose of Wilbraham, Mass., President of the Class of 1943, followed Mr. Carlson's remarks.

. . . *For 1917* . . .

The speaker for the 25-year Class, Edward Pennell Brooks, was then introduced. Holder of the Distinguished Service Cross for heroism in action as a first lieutenant in the United States Corps of Engineers in France in 1918, Mr. Brooks stressed the similarity between the situation of the Class of 1942 and that of his own Class a quarter century ago. His address follows in part:

. . . You have completed four years of study at the Institute, ending in a whirlwind finish. My Class did likewise. You are being graduated into the service of the nation when that nation is engaged in a major war. My Class did likewise. Before the Armistice in 1918, more than 400 members of the Class of '17 found themselves engaged in the effort to win that war. Before this war is over, you are likely to have an even greater proportion of your members in the service.

Although you are beginning your careers with the same educational background in this great school of engineering and science, I am confident you have one outstanding and important advantage over those who were graduated 25 years ago. At 20 years of age, my generation took for granted our state of society, our economic system, our established values. Doubtless all was not perfect in our world, but we had been brought up to believe the rules of the game were known and that they required only a little touching up. The great advantage that your generation has, it seems to me, is in realizing, as you people do, that your world is changing — that society, economics, values are in a state of flux, and that the rules of the game are being constantly rewritten. Certainly your realization of this fact is likely to make your generation a more effective one than ours has been.

But despite all that head start you have over us, you will find that the opportunities of learning new truths are not all behind you. You will discover, and promptly I dare say, of what great significance to your life is the institution from

which you are about to be graduated. You will find that your Technology heritage will begin serving you well, long before you can begin paying back your debt to Tech, or for that matter before you can do it any harm. . . . From this discovery you will go on to discover other things of which you haven't seen much in the books you have studied. . . .

I know the doubts which are troubling some of you as to your ability to discharge creditably your duties in the Army, the Navy, the Air Forces, or war industry, as you leave Technology and go to war. I have sensed again the satisfaction that is to be yours which comes from being in the service of the country — that clean feeling which comes from knowing your duty is being done.

We went to war in '17 as you are doing now in '42, and it would seem that there should be something in the record of the experience of my Class deserving of being passed on to you who are being graduated in similar circumstances. I have thought about the matter a good deal. I must fall back on a story to form the bridge from our experience in 1917 to yours of today.

The officers' training camp was over, and the men with their new commissions had been sent home to await assignment to the regiments then forming. A young lieutenant received a telegram late one night ordering him to report at once to the New York port of embarkation. Such orders meant only one thing — foreign service, which in August of 1917 had been something one dreamed about and thought of as an experience for the distant future. No amount of mental preparation avoids the sadness that comes to a family at the realization that a son is going overseas.

In less than 24 hours the young man was packed and at the depot to take the train to New York. I said good-by — this is a personal story — to my brothers, sister, and father, and there remained the farewell to my mother. It was not easy to open the door of the automobile to greet her. When I did, I found her dry-eyed and smiling. "Good-by, mother," I said. Her reply came back, "Fight hard, son. And remember you will have your men to look after."

Up to that moment my thoughts had been turned inward. I had been thinking about myself, my duty to make good. That charge from my mother turned me about, so that I saw my task more clearly. Twenty-five years later I want that charge to be the farewell message to you from the Class of 1917, whose spirit will ever be at your side, confident that you will carry the tradition of Technology to honor and glory: Fight hard. And remember you will have your men to look after.

The traditional events of Class Day completed the program following Mr. Brooks's remarks. The class gift — a pledge of $1,250 and a cash contribution of $250 to the Alumni Fund — was presented by Mr. Coe and accepted in the name of the Institute by President Compton. The Glee Club sang. The seniors, through their Course representatives, were initiated into the Alumni Association. The Beaver orator, Franklin P. Seeley of Stamford, Conn., then spoke. The class banner was presented by B. Edwin Hutchinson, '09, President of the Alumni Association, and accepted by Mr. Coe, and, with the singing of the "Stein Song," Class Day was concluded.

In the interval between the last primarily undergraduate function of the new Alumni and their participation in their first truly alumni affair — the Alumni Day banquet that evening — the dedication of Technology's fourth 110-class sloop, a tea dance in Walker, and the Allan Winter Rowe Memorial Regatta on the Charles busied students, Alumni, and guests.

Edward Pennell Brooks, '17, speaker for the 25-year Class

. . . *The* Ford . . .

Presented by the Class of 1917, whose spokesman was John A. Lunn, the new sloop was received for the M.I.T. Nautical Association by Walter C. Wood, '17, master of the Senior House and sailing master of the Nautical Association. Stressing the interest which Horace S. Ford, Treasurer of the Institute, has taken in the development of sailing as well as in all other Institute activities, President Compton introduced Mrs. Ford, who christened the new sloop the *Ford*. Kenneth L. Warden, Jr., '43, of Quincy, commodore of the Nautical Association, presented Mrs. Ford with flowers and announced the inauguration of the Horace S. Ford Trophy, to be sailed for by boats of the 110 class in intramural racing. The trophy, a model of a 110, was made by Elmer H. Peterson, modelmaker of the Department of Naval Architecture and Marine Engineering at Technology. The colorful ceremony on the Sailing Pavilion dock was concluded with a nautical parade, in which the four 110's and the dinghies of the M.I.T. fleet passed in review before enthusiastic spectators.

. . . *The Alumni Banquet* . . .

For a day of activities which had opened so auspiciously with the Class Day program, the stein-on-the-table banquet that evening at the Hotel Statler was an appropriate conclusion. This year for the first time the members of the graduating class attended en masse, and, since the numbers of returning Alumni had remarkably well withstood dislocations resulting from the earlier date, the hotel ballroom was filled almost to capacity. The dinner committee — D. Walter Kendall, '24,

M.I.T. Photo

Miss Julia M. Comstock, honorary member of the Alumni Association

chairman, Kenneth E. Bell, '17, Josiah D. Crosby, '21, Larcom Randall, '21, Arthur L. Shaw, '09, and Herbert R. Stewart, '24 — had arranged a program of well-rounded interest. President Hutchinson went through it with dispatch, punctuated now and again by ebullient comment from the Class of 1937, which was celebrating its fifth reunion. President Coe spoke as representative of the graduating class.

A noteworthy event of the evening was the rendering of Technology's tribute to Miss Julia M. Comstock, who was formally inducted into honorary membership in the Alumni Association. Dr. Compton addressed to Miss Comstock the following citation:

In June, 1942, you will have completed 50 years of faithful and devoted service to the Institute in its offices of academic administration, beginning under the presidency of General Francis A. Walker. During this period, you have had supervision and responsibility for the maintenance and accuracy of the student academic records, personal oversight of the official Institute publications, and, latterly, direct charge of the personal and historical records of the founders of the Institute, of the members of its Corporation, and of its Faculty.

By reason of your acceptance of, and outstanding performance under, these responsibilities, you have become

Watchful Guardian of the Academic Traditions of the Institute,

Resourceful Compiler of Its Vital Statistics,

Authoritative Informant Regarding Its Academic Precedents and Procedures,

Curatrix of Its Historic Memorabilia.

In recognition thereof, and by virtue of the special authority delegated to me by the officers and Executive Committee of the Alumni Association, I hereby confer upon you honorary membership in the Alumni Association of the M.I.T., with all the rights and privileges pertaining thereto.

President Hutchinson presented Miss Comstock with a sheaf of roses numbering the years of her devoted service to the Institute. To citation and presentation, Miss Comstock replied graciously. The Class of 1892 then for a moment took over the proceedings, announcing that since an Alumna should indeed have a class, '92 felt that, being the best of all classes, '92 was none too good for Miss Comstock and had therefore elected her to its ranks.

As guest speaker, Oliver P. Echols, major general, United States Army Air Corps, gave a thorough and interesting picture of the situation of American military aviation. His address, the baccalaureate address of Governor Saltonstall, the commencement address of Dean Prescott, '94, and the graduation address to the Class of 1942 by Dr. Compton, are published elsewhere in this edition of The Review.

. . . *The Institute in Review* . . .

After General Echols' remarks, President Hutchinson brought the assemblage to their feet cheering as he introduced Dr. Compton. The time had arrived once again in the close interplay between Technology and its Alumni for Dr. Compton's anticipated annual family review of Institute affairs for Institute people, salient portions of which follow:

The role now being played by the Institute in our nation's war effort is, as you will see, very significant indeed, measured by any yardstick. In terms of budget, our special war operations in Cambridge are now running at between two and three times the rate of the Institute's normal peacetime budget and are rapidly increasing. The teaching and research staff has been approximately doubled. During the current year the total enrollment of students at the Institute increased about 50 per cent above normal because of the establishment of special emergency training courses, and this figure will again be doubled next year. To accommodate these activities, we have not only crowded our regular laboratories and classrooms to the limit but have built one small and two large permanent buildings and one very large temporary building, have added temporary stories on top of the George Eastman Research Laboratories, have bought a near-by industrial building, have rented large space adjacent to the Boston harbor, and have received from the Commonwealth of Massachusetts the loan of its fine hangar facilities at the East Boston airport. All these things have been done without publicity, without confusion, and in a highly efficient manner.

Our institution's actions in the corresponding situation prior to and during the last World War are, fortunately, preserved in *Technology's War Record*, the remarkable book published in 1920 by the Alumni Association of the M.I.T. I should like to review the Institute's preparedness and war effort of that period as a background for discussion of its similar program today. . . .

The Institute gave instruction to 8,802 men as specialists and experts for various government services, particularly for aviation and the merchant marine. To house the many special courses, some 22 temporary buildings were erected at a cost to the Institute of $550,929. The buildings included barracks, mess hall, armory, hospital, hangar, laboratories, administration center, and even a recreation center and a bandstand. It took this present war to get rid of the hangar, the last of these temporary structures. This special training program,

carried out with distinction under great pressure and in the absence of any well-planned national program, was the most significant contribution made on the M.I.T. premises to the war effort. Among those prominent in the execution of it, who are with us on our staff today, are Prescott, Breed, Hunsaker, Fales, MacKinnon, Ford, Hamilton, Taft, Owen, Cowdrey, Peabody, Howard, Jones, and Riley. Doubtless there are others whose names I missed in the Record.

The record of research is rather obscure, presumably because of the confidential nature of the work undertaken. It seems clear from the Record that the fine facilities of the Institute in its new home were not used so intensively as President Maclaurin had hoped. . . . In undergraduate education much confusion arose from lack of any clear national policy and frequent changes in governmental regulations. The Record states that, "the Institute was prepared to utilize its staff and its equipment in the Nation's service, but difficulty was experienced in adapting the undergraduate curriculum to wartime conditions. . . ." Altogether, however, the undergraduate program in the last war is remembered as a nightmare by those who participated in it. The only ray of encouragement that I find in the Record is the phrase, "The unit at the Institute fared rather better than the average."

The Record points out that the greatest contribution made by Technology during the last war was through the services of its Alumni. When we remember that the total alumni body at that time was only about half its present size, the following figures from the Record are certainly significant. At least 4,897 Alumni were members of the United States Army, Navy, or Marine Corps, while 79 others served in the military or naval forces of the Allies. Of this number, 51 per cent were commissioned officers. Altogether, 7,000 Alumni were directly employed in war service, and in addition to these it is estimated that more than 80 per cent of the remainder, who were not in some special government service, were engaged in work of a nature essential to the war effort. . . .

Several personal items I cannot refrain from mentioning. One of these is the fact that Professor Samuel C. Prescott, '94, was serving the Quartermaster Corps 25 years ago, just as he is today. Also, Professor Jerome C. Hunsaker, '12, who 25 years ago had established the first school of aeronautical engineering in the United States and trained approximately half of the nation's aeronautical engineers of that time, is today the chairman of the National Advisory Committee for Aeronautics, top civilian position in this most important phase of the war effort. Likewise, I read in the Record that a distinguished Alumnus, George Ellery Hale, '90, carried the story of preparedness among the scientists of the country and secured by executive order of President Wilson, the establishment of the National Research Council, an organization for national defense under the jurisdiction of the National Academy of Sciences. And in this war the civilian scientific effort of this country is headed by our former Vice-President and Dean of Engineering, Vannevar Bush, '16, who is director of the Office of Scientific Research and Development, operating under executive order of the President. A former President of our Alumni Association, Frank B. Jewett, '03, is now president of the National Academy of Sciences. And our superfine Treasurer, Horace Ford, is today managing the erection of new Institute buildings for the accommodation of war activities just as, 25 years ago, he had charge of the erection of the temporary war buildings of that era.

Notable activities of 1917, as yet without a counterpart in this war, were the Massachusetts Institute of Technology Committee for National Service and the women's War Service Auxiliary, headed respectively by James Phinney Munroe, '82, and Mrs. Edward Cunningham. Also notable was the M.I.T. Military Training Camp at East Machias, Maine, named Camp Cunningham in honor of Edward Cunningham, '91. . . .

M.I.T. Photo

Oliver P. Echols, major general, United States Army Air Corps, Alumni Day banquet speaker

Thus we see that history repeats itself in that M.I.T. men are again occupying positions of leadership in the technological aspects of the nation in wartime. Not only in the work of individuals does history repeat itself but also in the basic organization of the Institute's war effort, as I shall explain.

The special training of technical experts has been formulated and administered most effectively in this war through the Engineering, Science and Management Defense Training Program of the Office of Education. It was organized by one of our Alumni, A. A. Potter, '03, dean of engineering at Purdue University, ably assisted by a younger Alumnus, Allen W. Horton, Jr., '36. Our own Dean of Engineering, Edward L. Moreland, '07, has been in charge of the operation of this program in New England. The Institute has co-operated with the other engineering colleges of the metropolitan Boston district in providing a well-balanced and well-divided program to meet the most urgent requirements for technically trained men.

Since March, 150 meteorologists have assembled for special training, and the largest of all the programs on practical applications of ultrahigh-frequency radio techniques has been inaugurated. This course will be given during the next 12 months to approximately 2,200 ensigns and second lieutenants from the armed forces. They will arrive in groups of about 200 a month, each staying for three months. The navy contingent in this group will have had elementary training at Bowdoin College and at Harvard University before coming to Technolgy for the more advanced program.

I cannot speak in too high praise and appreciation of the very able manner in which this special E.S.M.D.T. Program has been conducted at the Institute. A great many members of the staff have co-operated wholeheartedly, adding this extra teaching burden to an already crowded schedule. The direction of the program has been particularly well handled by a committee headed by Raymond D. Douglass, '31,

Professor of Mathematics, as chairman, and Arthur L. Townsend, '13, Associate Professor of Mechanical Engineering, as secretary, and including Joseph C. MacKinnon, '13, Institute Registrar; F. Leroy Foster, '25, assistant to the Director of the Division of Industrial Coöperation; and Robert M. Kimball, '33, Assistant Director of Admissions.

With the increasing scope and tempo of scientific applications in technology during the past 25 years, it is not surprising that the research aspect of the Institute's war activities looms relatively more importantly than it did 25 years ago. At that time the Record stated: "Research work connected with war problems was carried on in the laboratories of the Institute, and President Maclaurin is authority for the statement that at least one discovery of importance resulted from these investigations." In the present war, we can already say that not one but many developments of importance have come from the research work carried on in our laboratories. We can say that equipment built in our laboratories has already been used in successful operations against the enemy here and abroad. We can certainly say that some of these developments are given highest priority and are being procured in large quantities by the armed services.

Let me mention first the research laboratory of the Chemical Warfare Service. This whole operation is particularly gratifying because it exhibits an alertness on the part of our M.I.T. Corporation and Faculty and also on the part of the Chemical Warfare Service. The laboratory is now operating very actively and, I am told, successfully under the direction of a brilliant young chemical engineer officer, Jacquard H. Rothschild, '40, major, Chemical Warfare Service.

Most of the remaining M.I.T. war research activity is handled by contracts between the Institute and outside agencies administered through our Division of Industrial Coöperation. I think you will be surprised at the magnitude of this aspect of our work. There are at the present time a total of 88 such contracts. Of these, 33 are with the Office of Scientific Research and Development, 7 are with the Army, 4 with the Navy, 11 with the National Advisory Committee for Aeronautics, and 33 with industrial companies. The aggregate sum involved in these 88 contracts for the current academic year was $5,932,582. That the aggregate size of such contracts will be considerably greater next year is already clear. The provision of space and the recruitment of staff to handle these research projects have been no small task. . . .

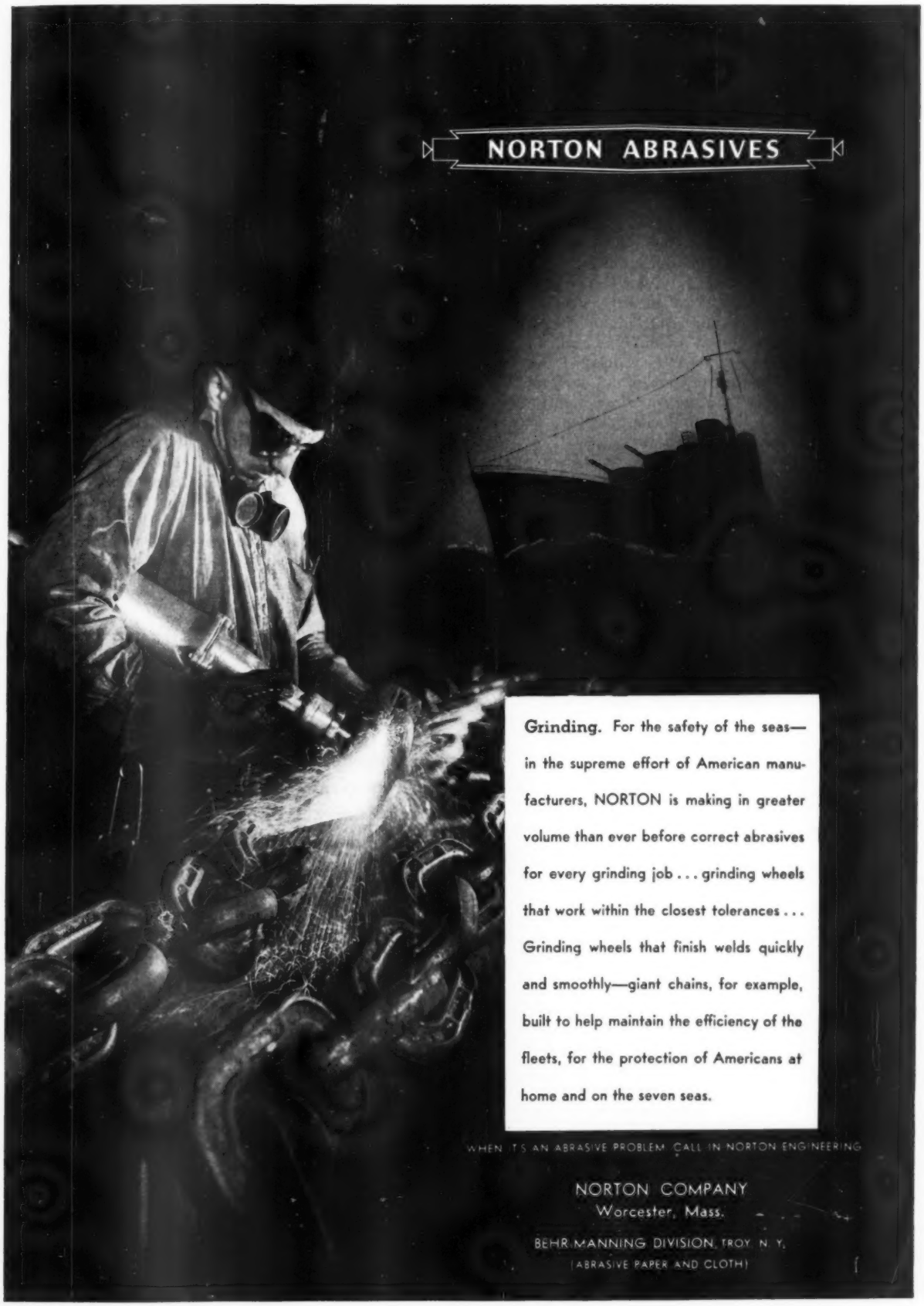
Much more than in the last war it is now generally realized that the continual supply of technically trained young men and women from our educational institutions must not be cut off in the early stages of the war emergency. Perhaps if we knew certainly that the crisis of the war would be passed in 12 months or 18 months, it would be legitimate to call out from our educational institutions and everywhere else all the available power to be put into this mighty effort. We have no assurance, however, that victory will come that quickly, and, consequently, to cut off now the training programs which can most efficiently continue to feed technical talent to our industries and armed forces would be a very shortsighted policy. Thus far, the Selective Service program has been administered from Washington and by the local boards in a manner which has given good recognition to the importance of advanced technological training and which has been considerate in the matter of permitting college students already enrolled to complete their current academic terms. Furthermore, the advice which has gone out to the local boards from the Washington office has continually emphasized the importance to our national effort of technically trained personnel, and all of the scientific and engineering aspects of the Institute's curriculum have been included in the category for which special provision has been made to permit well-qualified, regularly enrolled students to continue their work.

Coming more specifically now to our situation at Technology, the first significant point is that our educational program has thus far continued without substantial change or complication. We have speeded up the senior year by shortening the intermediate vacation and somewhat concentrating the work. From now on, the contemplated program is a sort of minimized speed-up, in which the freshman, sophomore, and junior years carry on as usual but in which the senior class begins its study almost immediately after finishing its junior year and carries on through the summer, fall, and winter terms in order to be graduated early in February. Accompanying this program is the arrangement whereby every undergraduate is expected to spend his summer vacation either in attendance upon a regular educational program or else in some work considered essential to the national war effort. Thus far, reports indicate that all of our eligible students should experience no difficulty in finding summer employment. . . .

The story would not be complete without mention of the extraordinary variety and interest of some of the work which is being performed by members of the staff outside the main categories of instruction and research. Several members of our staff are serving in important assignments in England and at Pearl Harbor. Quite a number have gone into active service as commissioned officers in the Army or the Navy Reserve. Typical of these are Clark S. Robinson, '09, Associate Professor of Chemical Engineering, a major in the Chemical Warfare Service, and Ralph D. Bennett, Professor of Electrical Measurements, a commander in charge of a research laboratory of the Bureau of Ordnance in the Navy. Edward L. Bowles, '22, Professor of Electrical Communications, recently became a special consultant to the Secretary of War. Robert G. Caldwell, Dean of Humanities, is continuing as an adviser to the State Department in the field of Spanish-American affairs. Walter G. Whitman, '17, Professor of Chemical Engineering, has taken over a large portion of the chemical affairs of the War Production Board. Douglass V. Brown, Associate Professor of Industrial Relations, is enjoying a well-earned rest from active duty since his return from a mission to Moscow. I hesitate to mention even these men because there are so many others who cannot be named through lack of time, but I think it is fair to say that our organization is working effectively and energetically, with a very fine spirit and with a division of labor which permits some to take the more spectacular jobs while others fill those which are less exciting but equally essential in making up an entire co-ordinated war effort.

When the whole story of the Institute's contribution to the war effort is told, it will undoubtedly show, as in 1920, that by far the greatest aggregate of contributions came through the activities of its Alumni. About these I am not now in a position to speak. The Alumni Association has only recently begun the maintenance of systematic records of war service by its members, and probably anything like a complete coverage of these activities will be impossible until the whole affair is over. It is important, however, that this record be kept. I would bespeak of all Alumni their co-operation with the Alumni Office in keeping it informed of the individual activities which, taken together, constitute Technology's role in this emergency.

I trust that this recital of M.I.T. and the war may have left you reassured that sincere efforts are being made to uphold Technology's tradition for national service. I realize that this recital has not been scintillating with wit and conviviality. It could scarcely be so, for the war is a grim business and we have settled down to do an unwanted job as efficiently as we know how. Our enthusiasm is not for the war or for these related war activities as such, but it is for the principles of freedom, fair play, and human justice (*Continued on page 410*)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NORTON COMPANY
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(ABRASIVE PAPER AND CLOTH)

BUILDING AIR POWER

(*Continued from page 368*)

Prior to the country's entry into the war, much progress had been made toward the conversion of the automobile industry to a war effort. In the aircraft field, General Motors Corporation was building aircraft engines, propellers, bomber parts, and many accessories; Packard had started the production of aircraft engines; Chrysler, Goodyear, and Hudson were building bomber parts; Nash was building propellers; Willys-Overland was making aircraft forgings; Murray and Briggs body companies were turning out bomber wings and gun turrets; Ford was producing aircraft engines, and its great bomber plant at Willow Run was almost ready to start production. With this experience already behind them, the discontinuing of automobile production and the conversion to the all-out effort called for as a result of the war were made without delay. To anyone who has followed this great transformation from day to day, it is apparent that the American industry can produce, and soon will be producing, airplanes to the limit of the available raw materials.

The co-operative spirit with which both the aircraft manufacturers and the automobile industry have attacked the problem of all-out aircraft production is exemplified by the joint projects undertaken by the various groups of manufacturers who are pooling their engineering skill and production facilities with the view of accelerating the mass production of bombers. The Vega, Boeing, and Douglas companies are building Boeing Flying Fortresses; the Consolidated Aircraft Corporation and the Douglas and Ford companies are building Consolidated B-24's; the Chrysler Corporation and the Goodyear, Hudson, and Martin companies are building Martin B-26 medium bombers; the General Motors and North American corporations are building the North American B-25 medium bombers; and other important co-operative projects are in the making.

Of especial interest is the present status of aircraft-engine production. At the beginning of the emergency — say about June, 1940, shortly after the President issued his dramatic call for 50,000 airplanes — the feeling was general that aircraft engines in the higher-horsepower bracket required for our latest combat planes would prove to be a very real bottleneck. Although plant tooling for this type of engine is a very complicated and expensive process, the American aircraft industry, with notable contributions from the automobile industry, has done an exceptionally fine job, so that fears of a shortage in high-powered engines have been allayed. For example, by January, 1941, the total United States aircraft engine output was nearly double the June, 1940, figure. With the added plant capacity made available during the year, the output was more than doubled again by November, far ahead of the schedule set by the Office of Production Management. Our sights have been raised again since our active participation in the war. The fact that the figure for last March was 68 per cent ahead of that for the end of 1941 is indicative of the astonishing progress that is being made.

(*Continued on page 384*)

To Young Engineers Who Have Moved Up Front

YOUR CHIEF is a busy man these days. New Plans — New Plants — Trips to Washington — Conferences — Priorities. His years of experience, that made tough jobs easy, are now needed for the tougher jobs that add up to winning the war.

Yours is the job of getting things done. The engineering for plant expansion and conversion is your responsibility. Your problems are many. Among them are the special applications of psychrometrics — temperatures, humidities, atmospheric pressures. You may have to set up sub-stratospheric tests and low temperature research equipment. Perhaps you will need oil cooling, rivet cooling, or refrigeration. You might require the air conditioning and ventilation of blackout plants, gauge rooms or assembly rooms.

The years of experience of the men of our organization are available to you, just as they were to the Chief. Tell us what you need, and, by combining ingenuity with engineering, we shall see that you get it.

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In one form or another, these astounding materials appear in such diverse essentials as food-can linings . . . and tank-car linings; as airplane cockpit covers . . . and non-flammable insulation for vital electrical wiring; as corrosion-resistant wrappings for cross-continental pipe lines . . . and welders' goggles; as the thin film on paper which is put inside bottle caps . . . and as the invisible interlayer in the sandwich of safety glass.

"Vinylite" resins can be formed, drawn, laminated, and bonded. In basic form, they are odorless, tasteless, and non-toxic, and range from non-flammable to slow-burning. They can be made stiff or flexible . . . hard or soft . . . colorless or almost any color under the sun . . . transparent, translucent, or opaque. And the result is resistant to oxidation . . . waterproof . . . alcohol-, alkali-, and acid-resistant.

These unusual properties have created a heavy demand for "Vinylite" resins, particularly to meet defense needs. This is why it is not possible, at present, to supply all manufacturers of articles for personal and home use with all the "Vinylite" resins needed. Against the return of more normal times, when larger quantities for normal uses will again be available, manufacturers are invited to test these new plastics . . . to develop new and improved things to be made from them . . . so that all can benefit from the discovery of "Vinylite" resins.

• • •

"Vinylite" resins and plastics are supplemented by the well-known products of Bakelite Corporation. The resins themselves are produced by Carbide and Carbon Chemicals Corporation. Certain elastic sheetings and films are made from these resins and marketed by National Carbon Company, Inc., under the trade-mark "Krene," while other compounded forms useful in electrical insulation are marketed by Haloway Corporation. The manufacture of all these products has been greatly facilitated by the metallurgical experience of Electro Metallurgical Company and Haynes Stellite Company and by the metal-fabricating knowledge of The Linde Air Products Company. All of these companies are Units of Union Carbide and Carbon Corporation.

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Producers of Synthetic Organic Chemicals

BUILDING AIR POWER

(*Continued from page 382*)

America's two major producers of air-cooled engines — Wright Aeronautical, and Pratt and Whitney — have expanded their own facilities, and their engines in the 1,200- to 2,000-horsepower class are being turned out in new plants by Ford, Buick, Chevrolet, and Studebaker. Allison is in full quantity production of its V-type liquid-cooled units for some of the country's fastest fighter planes; while attaining mass production, it has also been able to step up the horsepower per unit. Packard is now in good production on the liquid-cooled Rolls-Royce Merlin, power plant of the famous Spitfire and Hurricane fighters of the Royal Air Force. This is being used in the latest model of the Curtiss fighter, the P-40F, with good results. The Allison and the Merlin are both in the 1,200-horsepower class, similar to the German Daimler-Benz 601. Our most powerful air-cooled radial engines, however, are now in the 2,000-horsepower category and better, and are the mightiest and most reliable aircraft engines in quantity production anywhere.

In order to understand some of the many problems with which those charged with the Air Corps program are faced, one must realize that the aircraft manufacturer does not produce the complete airplane. He designs the plane, based on military requirements and type specifications supplied him by the Air Corps, and he manufactures a large part of the airframe. But the engines, propellers, wheels, generators, a large part of the electrical and all of the radio system, most of the armament equipment — including gun turrets and sights, automatic pilots, and bomb sights — turbo-superchargers, navigation equipment, and many of the instruments are furnished by the government. Designed to government specifications, they are purchased by the government and furnished to the manufacturer. In addition, a large amount of so-called vendor-furnished equipment is procured by the manufacturer from subcontractors. These supplies include hydraulic equipment, fuel installation, leakproof gas tanks, landing-gear legs, fittings, and a large number of other small items of equipment. The equipment manufacturers in turn have their vendors; for example, the engine manufacturer purchases magnetos, carburetors, spark plugs, crankcases, and bearings. Another requirement, of course, is for the fabricated materials, such as aluminum forgings, castings, and extrusions, and there is also the problem of tools.

The aircraft manufacturer cannot undertake to provide himself with these supplies. He looks to the procuring agency of the government to plan the sources of supply and provide the materials in such a way that they flow into his shop and into his production line in time to meet his schedules. The facilities and know-how to manufacture many of these complicated items were almost nonexistent in the United States in 1940. The War Department had to spend well over a billion dollars either in new facilities or in retooling existing shops which manufacture the accessories necessary for the

(*Continued on page 386*)

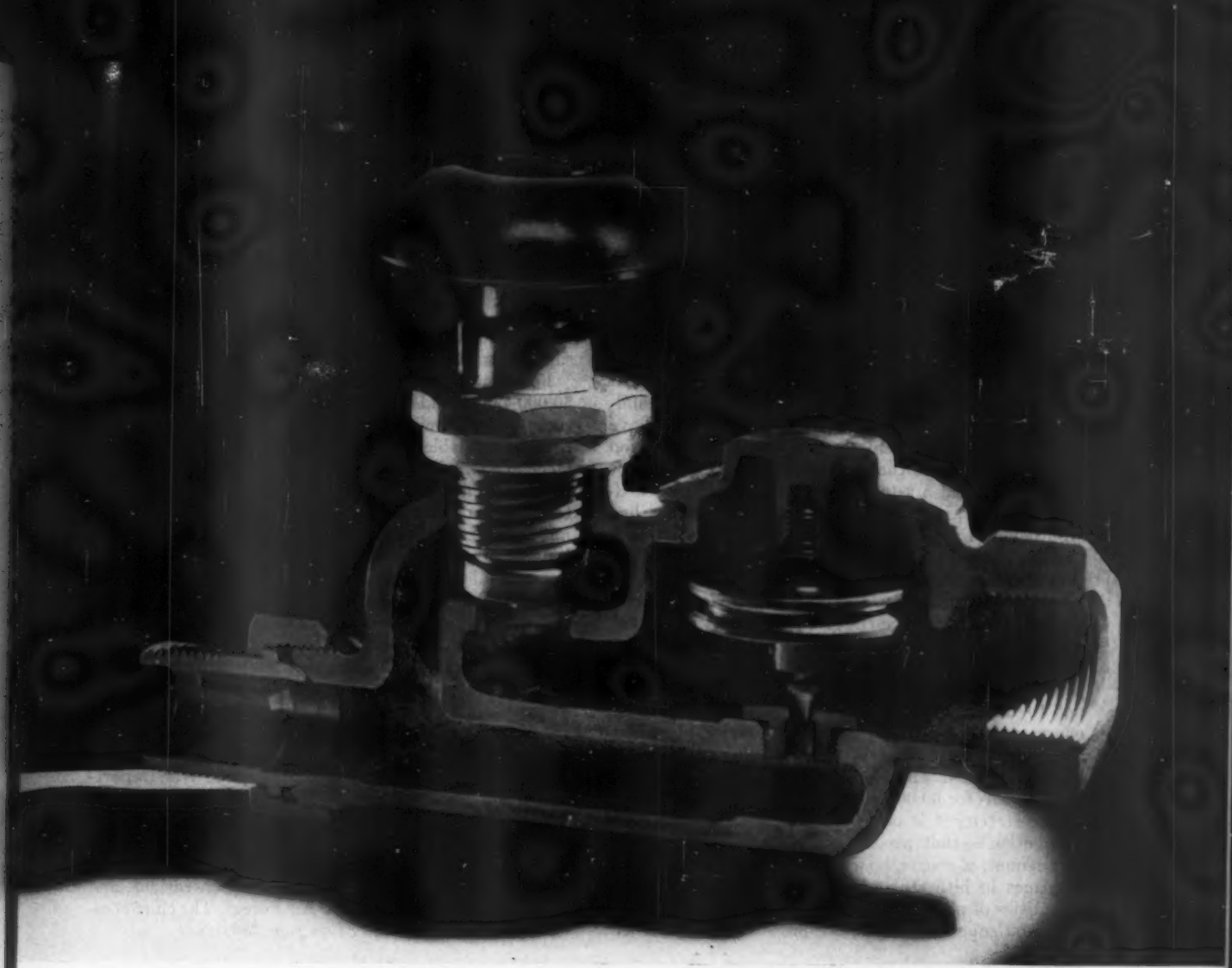
Clarence Cochrane '17

OLIVER WHYTE COMPANY

MACHINED WELDMENTS
IN STEEL

WIRE, BRONZE, ALUMINUM
MONEL AND STAINLESS
FABRICATION

MEDFORD, MASSACHUSETTS



The Webster Double-Service Valve incorporates a Webster Thermostatic Trap and a Webster Radiator Supply Valve in a single compact unit. The trap part keeps a down-feed supply riser cleared of condensate, discharging it *into* the radiator. The valve part governs steam admission to the radiator.

"—saves six fittings"

Every time a Webster Double-Service Valve is used it replaces two units—a trap *and* a valve.

Saves six or more items of pipe and fittings.

Saves critical materials.

Saves pipe and steamfitter's time.

That is why keen-minded engineers have called for unprecedented quantities of this Webster device in connection with cantonments, military hospitals, ordnance plants and other war production plants of one-story construction.

The Webster Double-Service Valve fits splendidly wherever there is a downfeed supply to a direct radiator or convector.

In addition to the other savings, the cast iron body of the Double-Service Valve conserves needed brass.

Dimensions and other information on the Webster Double-Service Valve are given in Bulletin 722-D, sent on request. Good deliveries for military and war production requirements on appropriate priorities.

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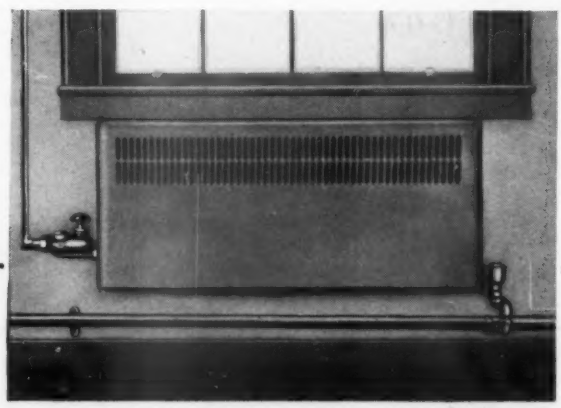
Representatives in 65 principal cities :: Darling Bros., Ltd., Montreal, Canada



View shows downfeed supply riser, Webster Double-Service Valve, convector radiator and Webster Radiator Trap as installed in a U. S. Army Air Corps Hospital.

-since 1888
Webster
Systems of
Steam Heating

BUILDING AIR POWER

(*Continued from page 384*)

aircraft program, the Army's share of which will involve the expenditure of approximately twenty-five billion dollars within two years from September, 1940. When it is realized that in these circumstances the responsibility of the government procuring agencies is to have materials and equipment flowing into the production lines of the shops of the increasingly proficient aircraft manufacturers at a rate greatly in excess of any schedules that they, in their most optimistic estimates, had even believed approachable, then some appreciation is possible of the task involved.

It is unfortunate that we have no better measure for aircraft production than the numbers produced during a given period, because the size and quality of aircraft are an extremely important part of the productive effort. In view of the public clamor for large numbers of airplanes each month, a good deal of fortitude is required not to take the line of least resistance and produce enormous quantities of small fighters and light bombers. We have undertaken a very large output of long-range heavy bombers. The President's program, as it now stands, calls for 60,000 tons of aircraft a month.

The statement is often heard that this is a war of production — that production will win the war. This war cannot, of course, be won without the production of airplanes in hitherto unheard-of quantities, but large quantities of planes will count for little unless they are based on superior designs, are properly equipped with the most modern armament and navigation devices, and are manned by highly skilled combat crews. Furthermore, they are useless unless they can be transported to the combat zone at the proper time and are amply supplied while engaged in combat.

For 1942, we were planning training programs for 30,000 pilots and 100,000 mechanics a year, but now these rates are being greatly increased as fast as facilities become available. The instruction of the pilot and the mechanic is, however, only a small part of the training problem. Pilots, navigators, bombardiers, radio operators, gunners, and mechanics are trained as specialists, not as combat units. The organizational training which is necessary to make combat organizations — that is, the operational training of the combat crews in the squadrons and the groups — is a long and tedious process and is just as essential in an air force as are the many months required to prepare the infantry divisions of the Ground Forces for combat. The layman often has the impression that a new pilot out of a flying school takes a new airplane out of the factory and goes to war. This is the surest way to defeat. It is the combat organization, with its training as a team, which will win battles.

The new, streamline organization of the War Department provides a General Staff and three commands — Ground Forces, Air Forces, and Services of Supply. Henry H. Arnold is commanding general of the Army Air Forces, which consist of a staff for plans and policy, a special group of officers for directing operations, and the various commands of the Air Forces. The chief com-

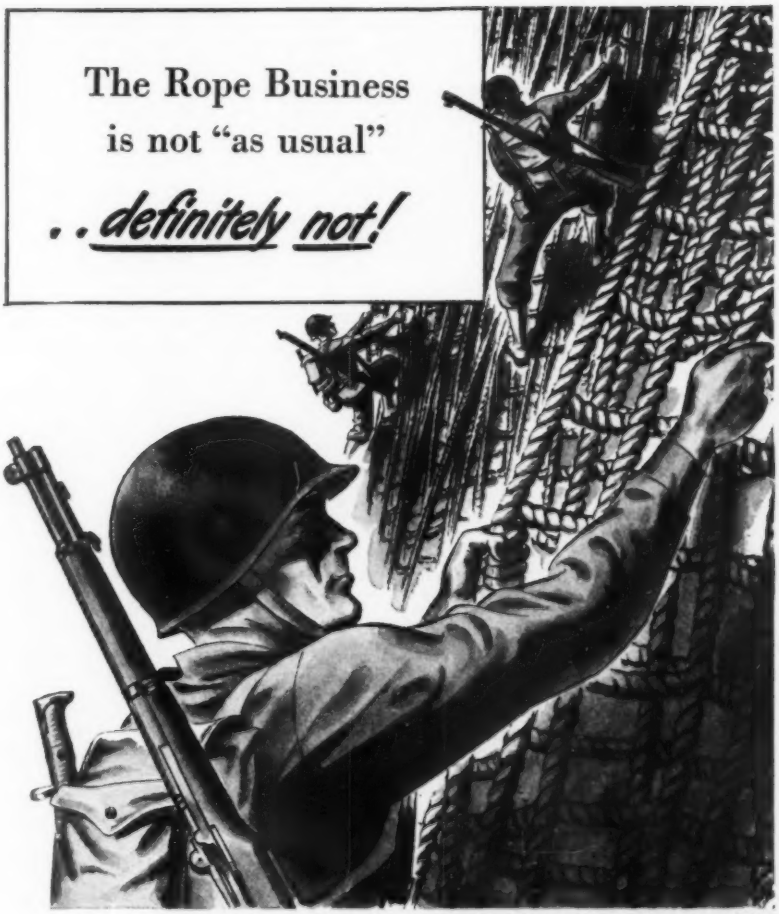
(*Continued on page 388*)

POOR & COMPANY

RAILWAY EQUIPMENT

CHICAGO, ILLINOIS

The Rope Business
is not "as usual"
..definitely not!



U. S. Landing Party leaving ship on Rope Ladder

The rope business became very *unusual* on December 7th, when shipments of Manila fiber suddenly stopped. It kept getting more and more *unusual* as the Japs moved into the East Indies, prime source of sisalana fiber. Our two-ocean Navy, our Army, our war production—need rope as never before.

It's up to you to save rope. *You* yourself may never handle a piece of rope—still you can save it by asking your workers to make rope last longer through proper care.

"Making Rope Last Longer" is a Plymouth booklet that will do much to prolong rope life IF—employers urge workers to use it as a guide... if distributors, dealers, and salesmen pass it on to their customers.

This is no time to sell rope, or use rope, *as usual*. Write for your FREE rope conservation material today to Plymouth Cordage Company, North Plymouth, Massachusetts, or Welland, Ontario.

What Is "Wartime" Rope?

Manila rope is restricted to war use only. Plymouth "Wartime" Rope is made of best available fibers, for civilian needs. Except for a few very special uses,* Plymouth "Wartime" Rope will serve satisfactorily.

*As outlined in War Service Book No. 3—Free copy on request.

PLYMOUTH
ROPE FOR INDUSTRY
BINDER TWINE • TYING TWINE

BUILDING AIR POWER

(*Continued from page 386*)

mands are the flying training command, which trains air crews; the ground training command, which trains mechanics and technicians; the air service command, which is charged with the storage and issue of supplies and the maintenance of equipment in the service; the ferry command, which delivers airplanes by air from the factory to the tactical units either in the United States or overseas; the operational training command, which trains combat units; the combat air forces, or task forces, which are self-contained combat units for duty in this country or overseas; and the matériel command.

The matériel command is of special interest. It is charged with research and with development, procurement, and production of all aeronautical equipment for the Air Forces. The headquarters of the command are in Washington, but its principal activity is the Matériel Center at Wright Field, Dayton, Ohio. The experimental laboratories, the production and contract sections, the industrial planning section, and the flight test section are located there. This command, with its field agencies, is the organization responsible for carrying out the Army's share of the President's aircraft production program.

One of the most important jobs of the matériel command is to insure that our airplanes fly faster and higher, are more heavily armored, carry greater fire power, are more maneuverable, have longer range, and have greater bomb- and troop-carrying capacity than those of the enemy. At the Matériel Center at Wright Field, 76 graduates of M.I.T. — 23 as civilian engineers and 53 as Air Corps officers — have been working for many months, some of them for many years, to keep America's airplanes in condition to fight it out with any of the enemy's best planes.

This is a technical war, a war of new machines. If we slacken our experimental work, we will fail to maintain superior warplanes and our pilots will lose the battle. The demand is for more and more trained engineers in the government service and in industry. Because of the small number of Air Corps engineers and because the very limited engineering staffs of the aircraft industry are devoting so much of their time to production problems, development work on new aircraft designs, engines, propellers, superchargers, armament, and accessory equipment is likely to lag unless the engineers and scientists of the United States accept the same responsibility for aeronautical development that American industry has accepted for production.

Our goal is not an easy one to attain: one hundred and forty-seven thousand airplanes to be produced for the Army Air Corps in two years, 70,000 pilots a year to be trained, and a 2,000,000-man air force. Such figures would have been considered fantastic a few months ago. Are we going to reach this goal? I see no reason to be discouraged. The training program is making splendid

(*Concluded on page 390*)

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SOME WAR PRODUCTS *of* CHRYSLER CORPORATION

BUILDING AIR POWER

(*Concluded from page 388*)

progress, and the great manufacturing plants which have been in process of construction and tooling up are beginning to roll. America's combat aircraft, the finest in the world, are coming in considerable numbers. We are now producing more aircraft than any other nation, and each month sees an ever increasing number.

At present we are on the defensive and must try to hold such bases as we can until we have the air power to pass to the offensive and recapture lost ground, step by step. With our large fleet of powerful, heavy bombers and fighters, we shall be able to attack Germany and Japan and establish that dominant air superiority which is necessary to permit our ground and naval forces to operate against the enemy. The initiative which has been held by the Axis nations, as a result of their carefully planned aggression, will be lost as soon as the United Nations establish air superiority in Europe. Once the Axis is on the defensive, its defeat is certain.

BEYOND VICTORY

(*Continued from page 370*)

In short, we must always be as strong and eager to maintain anything that we value as we were strong and eager to win it in the first place. This is a general law of life. It applies to holding the love of a wife after you have won it, to living a life of high ideals after you have discovered them, to maintaining your professional skill after you have gained it, to keeping money after you have earned it; it applies to our freedom, won by centuries of human struggle and self-discipline, for if we are not ever alert and strong to keep it, freedom can be lost very rapidly — by sudden disaster or by insidious encroachments; it will apply to whatever form of improved world order emerges from the present struggle.

We have learned that peace is a pearl of great price, which costs much to win and much to maintain. We have learned that we may sometimes have to maintain peace by force. Just as we acknowledge that police power is needed to maintain peace and security in a city against the fringe of thugs and gangsters who would substitute terrorism if allowed to operate unopposed, so we have learned in international affairs that failure to exert an ounce of forcible prevention can lead to need for many pounds of terrible cure. For example, had the peace-loving nations possessed an adequate police force and had they used it vigorously when Japan invaded Manchukuo or when Italy invaded Ethiopia or when Hitler marched into the Rhineland, then almost certainly this world catastrophe could have been avoided. Had the peace-loving nations joined sternly to put a stop to Germany and Japan's intensive warlike preparations before they became too strong to stop, we should have been spared another World War.

I hope we have learned that certain things are worth fighting for — things like freedom, the right to live in peace, the integrity of home and country. In the re-

(*Continued on page 392*)

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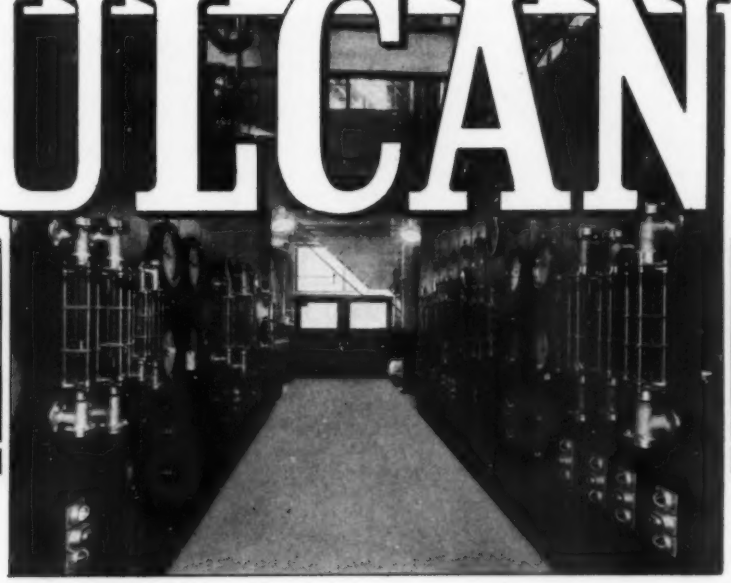
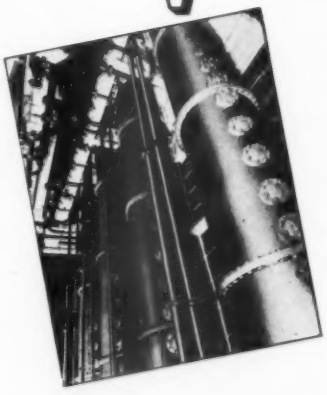
VULCAN





THE Vulcan organization is proud of the service which it is rendering during the current National Emergency. Production of specialized equipment for Distillation, Evaporation and Extraction processes is at a higher level than at any preceding period of the company's history — thanks to a unified and intensified organizational effort and expanded plant facilities.

We pledge, to all whom we serve, that we will continue unrelentingly in our effort to further increase our output until the Battle of Production is won.

·DISTILLATION·
EVAPORATION·EXTRACTION

VULCAN COPPER AND SUPPLY CO.
CINCINNATI, O., U.S.A.

BEYOND VICTORY

(*Continued from page 390*)

action from the last war, some people went as far as to hold that nothing could justify fighting and sought to pledge young men under no conditions to go to war. I believed then, and believe now, that this attitude was a mistake, perhaps a tragic one, however laudable its motives. For it is clear that a man will fight, if necessary, to protect his family; that a city will exercise police power, if necessary, to enforce law and security; that a nation will go to war, if necessary, to preserve its freedom and the security of its citizens. When peace is again established, I hope we shall have learned from the past 20 years that, when any nation invades another's boundaries, it is far better for the peace-loving nations to go promptly together on the warpath and force the aggressor nation to withdraw, than to refuse to face the unpleasant issue and let such situations grow and multiply into a major catastrophe.

Thus, appraising the last 25 years scientifically and considering this period as a vast experiment, or experience, in world living, we have drawn the following lessons:

Democracies can win.

Relative military unpreparedness is costly and dangerous.

We must be willing to do our share in world administration and in co-operative enforcement of peace.

We must be as alert and vigorous to maintain peace and freedom and to make democracy work, as we have been to secure them.

If we have learned lessons like these, then I do not believe that the last 25 years have been years of failure, or that we have any right to be cynical over the recurrence of war or to lose the urge of idealism and hope, which are the qualities that make life worth living. What we must do is to try again — first to win this war and thus preserve our freedom from violent attack, then to organize a world peace that will permit us and all other nations to work out our own destinies as we wish and without molestation, and finally, and all the time, to deal so uprightly and unselfishly with our fellows, be they persons or be they nations, that intercourse may always be a stimulus of good satisfaction and not an irritant of antagonism.

There is one more personal lesson which you can draw for your comfort from the experience of those who 25 years ago, like you today, were the first to be graduated into our nation at war. Some of you have felt that the war will wreck the careers for which you have so arduously and hopefully prepared yourselves, that your training will be wasted and your ambitions dashed.

(*Concluded on page 394*)

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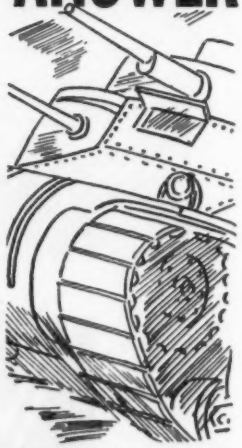
Right now, we are all out for America . . . and that's the way it's going to be . . . until the final blow has been struck at our foes

If we can help America's victory program by helping you on your war orders . . . LET'S GET TOGETHER



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INCANDESCENT LAMPS. Ranging from the common types for ordinary use to the rugged types that defy battleship shocks.

AMONG OTHER PRODUCTS is a luminescent pigment for paint, which causes the painted surface to glow for several hours after it has been exposed to light for even a few seconds. Hygrade Sylvania is also devoting its extensive engineering and manufacturing facilities to many articles for government use, which naturally cannot be specified.

EIGHT FACTORIES in Massachusetts and Pennsylvania, with a ninth nearing completion.

TRIBUTE TO TECH. The delicate character of our work calls for engineering ability of the highest order. So Hygrade Sylvania acknowledges its debt to Tech for the large number of brilliant Tech men who occupy positions of responsibility in all of its factories.

HYGRADE SYLVANIA CORPORATION
General Corporate Office, Salem, Mass.

BEYOND VICTORY

(*Concluded from page 392*)

The experience of the Class of 1917 does not support any such pessimistic outlook. Personally and professionally that Class, as a group, has fared like any other class. The war did interrupt many a plan for the time being, but even the war experience furnished its full quota of opportunity for maturement, for development of self-discipline, self-confidence, and, frequently, even increased professional skill. Do not, therefore, feel that this episode has thwarted your hopes and ambitions. Only if we should lose the war, will your future be seriously jeopardized; hence all the more reason for pitching in to win it.

Though we recognize that danger and difficulty confront you as you leave this institution to take your place in the great struggle for a better life, we are thankful that you and we can do this job together while the hopes of 25 years ago are still alive and the lessons drawn from recent failures are still fresh. Trained in the scientific method, we should not repeat old failures but benefit by former experience to make the present effort more successful. So it is with courage that you go forth and it is with faith that we bid you Godspeed.

PROSPECTS AND RETROSPECTS

(*Continued from page 372*)

bring, and chance, while ordinarily regarded as a fickle and uncertain thing, opens doors of opportunity far more frequently than we might expect. As a result, many graduates do not follow strictly the field in which they begin professional work. Ability to recognize and grasp fearlessly the unexpected and unusual opportunity if and when it arises, to "strike while the iron is hot," as we say, and convert such a chance happening into a vital part of a real career is an evidence of ability to do sound thinking and to make decisions quickly and wisely.

As to the immediate future, we understand that some of you may feel that your careers in your hoped-for work in science or engineering have been suddenly nipped in the bud by the demands of war. Seemingly perhaps cherished plans and ambitions are thwarted and must be abandoned. The future may appear dark and beclouded when it should be sunny and full of promise. I hope I can convince you that this need not be so. On the contrary, if your vision is not too myopic, and if your faith in your country and yourself is deep and strong, you will some day resume your chosen professional activities. Many months, possibly years, may pass before our national life is again what we call normal, but I cannot conceive that we are so weak willed or lacking in spiritual resources that we shall not again irresistibly return to peace and the American way of life.

At all stages in adult life we have our prospects and our retrospects, but the former are essentially the prerogatives of the first half of a man's life, while the retrospects and memories become increasingly a part of the stock pile in the mental storehouse of advanced life. Unfortunately, these memories may become distorted,

(*Continued on page 396*)

WARTIME SHORTAGES

... *A Blessing in Disguise?*

During the last war the substitution of carbon black for other pigments brought about a phenomenal improvement in automobile tires.

Could a carbon having the following characteristics be even more than a satisfactory substitute in your industry?

- **High purity—less than 0.1% ash**
- **Nontoxic, nonirritating**
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We produce thirty-three different carbons under controlled conditions with surface areas ranging from 100 to 900 square meters per gram, pHs from 2 to 6, and having a wide range of absorptivity and electrical conductivity.

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We invite inquiries and our laboratories are eager to help in the investigation of new fields of usefulness for these carbons.

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PROSPECTS AND RETROSPECTS

(*Continued from page 394*)

and sometimes interfere with and impair the elderly man's view of the future which should be all the more clear because of his long experience and knowledge of the trend of past events.

Fortunately, therefore, in the marching column of human life that tramps on ceaselessly and inexorably, new battalions of young men like yourselves — idealistic, courageous, and vigorous — constantly pour in to replace those who fall out of the lines. Clear-thinking new leaders, virile and endowed with high ideals and broad concepts of human service, replace those to whom the years have brought not only age and diminishing strength but often ultraconservatism and a static point of view. There will still be much useful work which the man in vigorous old age can do, but the relatively young man who approaches the future with a high sense of patriotic service, human justice, and social consciousness as well as with superior technical armaments will destroy the self-appointed dictators and their evil works. Men of your type can, if they will, do much to improve the standards of civic and national life and save their country and its cherished traditions. If this ideal of professional service is the high prospect for which you will strive, your later retrospections will be repaying indeed.

In an address, presumably to young men, Longfellow once said: "Look not mournfully into the Past. It comes not back again. Wisely improve the Present. It is thine. Go forth to meet the shadowy Future, without fear, and with a manly heart." I can heartily recommend this advice to you, especially in these days when the blight of war is upon us. On the other hand, I would not debar those pleasant memories of youth and of student days, with hard work and happy associations, which will mean much to you as you travel the pathway of life. One might recall a line of Dante: "For oft a retrospect delights the mind." Despite the fact that youth comes not back again, if he is willing, one may learn something from his missteps and errors as well as from his successes. Thus he gains a surer attitude toward what Matthew Arnold called the conduct of life.

I have reiterated the idea that what you now *plan* to do with your professional training and your individuality will promote accomplishment, although you cannot completely forecast the future and must meet contingencies as they arise. But there are other nonprofessional aspects of living which will demand a place in your prospectus — your social and civic obligations, and the special interests you may cultivate as a means of self-expression or as a relaxation from the exacting duties of professional life. I have great pity for the man who retires from active life or who approaches my own age without having developed some special avocation or who has failed to find an interest in a hobby.

Among the obligations which should surely command your consideration are your duties as citizens, and your responsibilities and loyalty in deed as well as word to the

(*Continued on page 398*)

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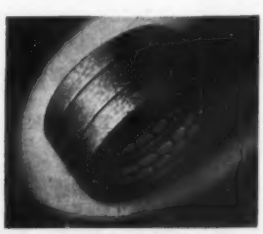

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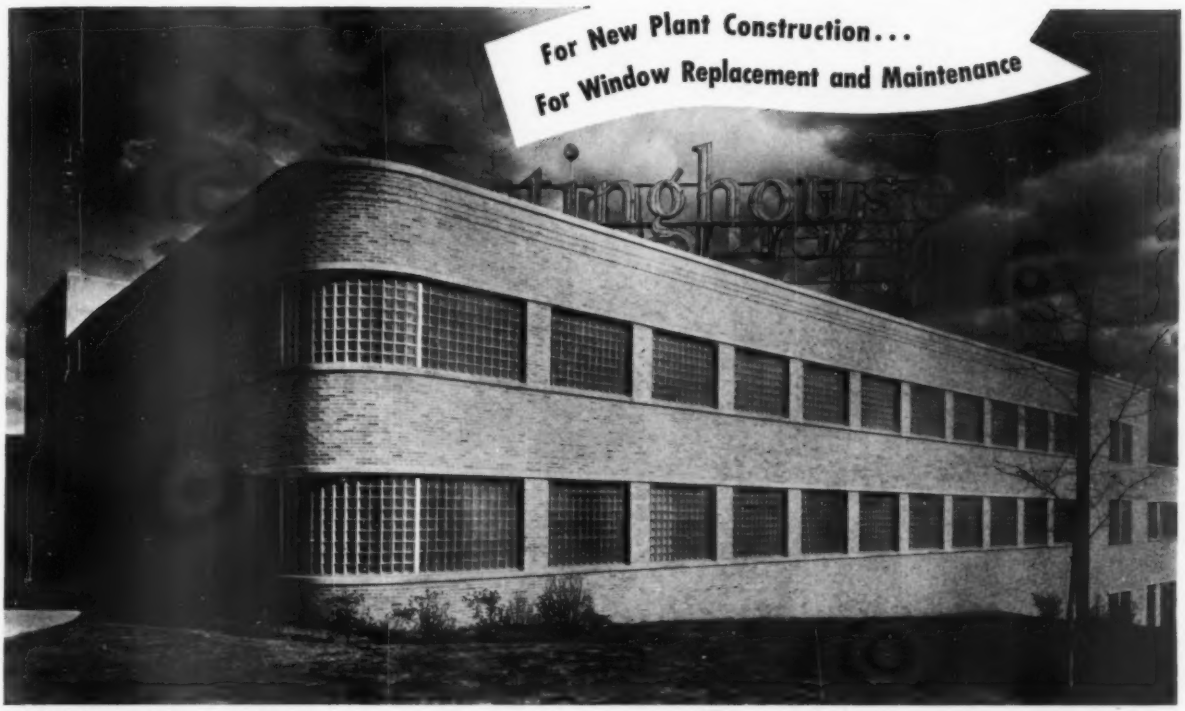
Branches: Boston, Philadelphia, Baltimore, Norfolk, Chicago
to
THE MARINE AND INDUSTRIAL TRADE

OFFICERS:

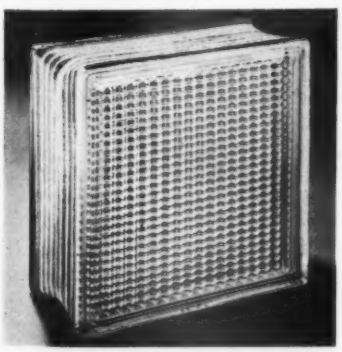
H. S. Fitz Gibbon, President
L. J. Fitz Gibbon, '35, Vice-President
C. S. Fitz Gibbon, Treasurer
H. S. Fitz Gibbon, Jr.'39, Manager of Boston Office

INSULUX Glass Block is In the Service of War Production



Westinghouse Building, Atlanta, Georgia
Robert and Company, Inc.
Architects and Engineers, Atlanta
Rust Engineering Co., Contractors, Birmingham

• • •



The new INSULUX Prismatic Block which bends incoming daylight to the ceiling. Since a high percentage of light is then reflected downward, this means even lighting for deep interiors. INSULUX is carried in various sizes and designs by authorized distributors in principal cities.

Owens-Illinois INSULUX Glass Block is a functional light-transmitting material with special characteristics that recommend its use in wartime building. It is finding wide application today in construction of new war plants and in window replacement for existing plants.

A hollow, partially evacuated and hermetically sealed block of water-clear glass, INSULUX transmits daylight, diffuses it and even directs it. Panels of translucent INSULUX Glass Block maintain privacy for war work—keep prowlers from looking in. However, transparent block is available when limited vision is desired.

Because of its high insulating value, INSULUX saves power used in air conditioning and fuel used in heating.

It can be installed in small panels with no metal, in large ones with little metal, thus conserving scarce materials for implements of war.

Like all building materials, INSULUX is sold only in accordance with government building regulations. Our job is to manufacture INSULUX in sufficient volume to meet industry's demand for war construction, window replacement and maintenance purposes—to recommend its use only where it will contribute to more efficient production.

Owens-Illinois Glass Company, INSULUX Products Division, Toledo, Ohio.

OWENS-ILLINOIS
INSULUX
Glass Block

For more information, write for the new INSULUX Booklet, "Alternate Construction Details," which shows how to install INSULUX with little or no metal. Covers both new construction and replacement.

C. H. REED '20
President, Forbes Varnish Co.

W. G. LOESCH '21
Vice Pres., Forbes Varnish Co.

Serving Those Who Serve America

OUR laboratory and research departments have compiled a group of Technical Bulletins which are authoritative and accurate as to government specifications on war finishes.

You may have any one, or all of these bulletins by simply writing to THE FORBES VARNISH COMPANY.

70-A Crank Case Sealers.

80 Machinery Lacquer System.

81 Synco-Clear Baking Primer 8357.

82 Nitrocellulose Lacquer Enamel for Ammunition — U. S. Army Spec. 3-162-A.

83 Zinc Chromate Primer, Navy Aeronautical Spec. P-27b-2.

84 Glyceryl Phthalate Aircraft Enamel — Navy Aeronautical Spec. E-5e.

85 Glyceryl Phthalate Black Enamel — Navy Aeronautical Spec. E-6e.

86 Zinc Chromate Priming Paint — Picatinny Arsenal Spec. PXS-783. Rev. 3.

87 Zinc Chromate Metal Primer — Army Air Corps Spec. 14080.

88 Black Out Paint No. 1.

89 Cellulose Nitrate Camouflage Lacquer — Army Air Corps Spec. 14105.

90 Quick Drying Camouflage Enamel — Army Air Corps Spec. 14109.

91 Synthetic Lt. Gray Baking Enamel (For Metal Bedsteads and Cots).

Quartermaster Corps Specification C.Q.M.D. No. 5 (sometimes referred to as "Exceptions in Specifications No. 32-2A and 32-7A").

92 Black Out Paint No. 2.

93 Synthetic Rust-Inhibiting Primer — Yellow Green (QMC-Tent. Spec. ES-359b).

94 Synthetic Lustreless Olive Drab Enamel (QMC Tent. Spec. ES-No. 474-C).

95 Synthetic Blue Drab Stenciling Enamel (QMC Tent. Spec. ES-No. 510b).

96 Paints for Ammunition, U. S. Army Specification 3-67C.

97 Acid Proof Black Paint for Ammunition, U. S. Army Spec. 3-106-E.

98-A Class 1 Rust-Inhibiting Primer; Class 4 Lustreless Olive Drab Enamel HQD ES No. 680 — Holabird Quartermaster Depot Tent. Specification Protective Coating Materials — Synthetic Type.

98-D Class 5 Lustreless Blue Drab Enamel — HQD-ES-680 — Holabird Quartermaster Depot Tent. Spec. Protective Coating Materials — Synthetic Type.

98-E Class 20 Lustreless Coronado Tan Enamel including Undercoats, Lustreless Enamels and Stencil Colors, Gloss Enamels and Stencil Colors — Miscl. HQD ES No. 680 — Holabird Quartermaster Depot Tent. Spec. Protective Coating Materials — Synthetic Type.

99 Exterior Lacquers and Paints Used on Bombs and Projectiles Purchased by the Navy — Navy Ordnance Specification OS-1210, Navy Ordnance Pamphlet 368.

100 Warm Drab Air-Drying Lacquer and Thinner — Chemical Warfare Service Specification No. 196-131-59.

C-1a Warm Drab No. 21 Lacquer

C-1a (2) Lacquer Thinner

Miscellaneous War Finishes — Optional and additional, which we can supply, but which are not listed in our Technical Bulletins on war finish specifications.

THE FORBES VARNISH CO.

Finishes for the Products of Industry and War

3800 WEST 143rd CLEVELAND, OHIO

W. R. McKenney '19 M. J. Gordon '22

PROSPECTS AND RETROSPECTS

(*Continued from page 396*)

institution which has already been so largely instrumental in bringing you to a point where you can profitably sell your own services. You can be useful to your fellow men. Obviously, as with all of us, your present duty is a national one, and your country's future as well as present need of you will doubtless be a part of your planned anticipations. As I see you today and appraise your sense of loyalty, I can well believe that you place this obligation above the pursuit of personal security or the immediate gratification of your individual aspirations. For a short time your service may be in the factory or in the fleet, in the training camp or in actual combat, in some crowded office with its myriad minute details of the mechanism of war or in some remote outpost where your special technical knowledge may save the lives of many men. William Havard, an eminent Englishman, in a period of grave danger to his country many decades ago declared,

> Our country's welfare is our first concern,
> And who promotes that best, best proves his duty.

This is, I believe, the spirit that has ever dominated Technology from the days of its foundation, and you will carry on the tradition with courage and efficiency and honor. If we are to keep inviolate the ideals of life and liberty in which we have been nurtured, this spirit must prevail and permeate our whole country.

I have said that most of your life is in the future. According to insurance statistics, the men of your age group may expect approximately 50 years in which to pursue their chosen work. For this reason, therefore, I have been especially concerned with what lies before you, and the desirability of a general plan of action.

I shall now delve into my own retrospects covering a time period of similar length and see if I can summon from them anything which deals with comparable situations and which can offer you a historical basis for encouragement and hope. The Technology of 50 years ago was far different from the Institute of today though the same in its fundamental purpose — to train competent men of highest professional integrity. Small in numbers and resources, Technology resolutely met the challenge and the conditions of the period and with much self-sacrifice on the part of administration and staff. Many of its graduates became men of distinction and leadership. We may well be proud of its record. Today, when the demands for professional service have a far vaster range, as applied science has expanded tremendously in all directions, the Institute is meeting immeasurably greater opportunities with the same resolute spirit, the same belief in the necessity for sound basic training of students. But there have developed, in addition, an even greater appreciation of the values of personality and cooperative action in the human problems which confront the engineer, and a larger sense of obligation to provide leadership in the consideration of the great industrial, social, and economic problems of recent times. Through your training, your opportunities to help in the solution of these problems are far greater than those of the graduate of my student days.

(*Continued on page 400*)

The Hydro-forming Process Enlists for War Service

A year ago the Pan American Refining Corporation and its affiliated marketing organization, American Oil Company, maker of Amoco products, announced the first commercial installation of the new Hydro-forming Process. This catalytic conversion of paraffinic hydrocarbons to high octane aromatics was designed to make available more of the potential energy in the petroleum; and, by controlling combustion, to yield a motor fuel with smoother, more efficient performance.

With the coming of war, this process acquired new significance. Today we are making base stock for blending with other products to produce the 100 octane gasoline so vital to our war effort. And we are constructing a new, large plant for the extraction of toluene (used to make TNT) from Hydro-formed gasoline.

And so the process which was designed to put more power in America's peace-time motors is now putting its strength behind America's great drive for victory.

A List of M. I. T. Graduates with Our Company

ROBERT E. WILSON '16,
President

R. H. PRICE '21,
Director of Research, Texas City, Texas

P. E. DARLING '27,
Chief Engineer, Texas City, Texas

J. B. HAMBLEN '27,
In Charge of Hydro-forming Operations, Texas City, Tex.

L. W. MOORE '33,
Manufacturing Department, New York, N. Y.

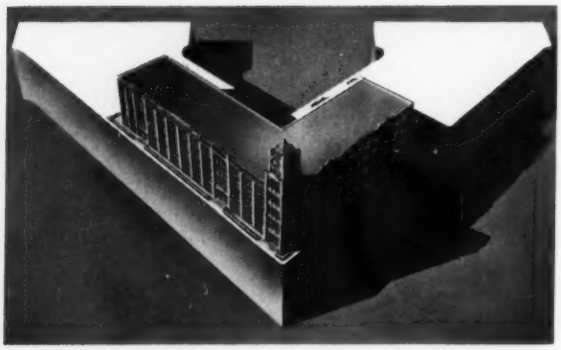
C. F. FEUCHTER '34
Manufacturing Department, New York, N. Y.

I. MAYER '38,
Research Laboratory, Texas City, Texas

E. J. STANTON '41,
Research Laboratory, Texas City, Texas

★ AMERICAN

OIL COMPANY



The home of Champion Lamps — where every worker, every engineer, every inspector is concentrating on the task of turning out the very best lamps using the least amount of critical materials.

Test racks for Quality Control. Here Champion Fluorescent Lamps are constantly being tested for maintenance of lumen output, uniformity, life, and compliance with Champion's high standards.

CHAMPION *Lamps*

FLUORESCENT INCANDESCENT

Since 1900 the Champion organization has specialized in the production of lamps of unsurpassed quality — licensed under General Electric Co. incandescent and fluorescent lamp patents.

Champion Lamps can help you provide the 25 to 100 foot candle light intensities that are playing such a vital part in keeping *war production* at the peak of efficiency twenty-four hours a day.

CHAMPION LAMP WORKS
Lynn, Massachusetts
A DIVISION OF GENERAL ELECTRIC LAMP CO.

PROSPECTS AND RETROSPECTS

(*Continued from page 398*)

In one of his great political speeches dealing with a crisis in national affairs, Patrick Henry asserted, "I know of no way of judging the future but by the past," and Stoddard expressed the same idea in his line, "The future will but turn the old sand in the falling glass of time." In classroom language, the implication of this might be that if we can clearly analyze and arrange the facts of past experience, we may in a fair measure extrapolate and predict the curve of the future. As you well know, the application of this principle statistically has been made in many ways, as for example in the prediction of changes of population, in vital statistics, in the working out of insurance tables of life expectancy, and in the study of business cycles. All these are practical applications of retrospection. To attempt statistical analysis as applied to present conditions or to predict your future as a class may not be equally logical since so many new factors in the problem have not been hitherto encountered, but a retrospective reference to some aspects of the past may not be without interest and significance.

For the third time within the period since I was in the position of a graduating student like each of you, our country has been plunged into a war not of its seeking. The first of these, the Spanish-American War, was not a major conflict and was soon terminated through superior equipment and some outstanding examples of leadership. Yet, at the time, student psychology was much like that at present, although the man-power needs of the country were infinitely less than today. Many students, anxious to be of service, left their studies and enlisted in the Army or Navy. Others were restrained with difficulty and waited until they completed their Courses. With the sudden ending of the war, a few remained in military or naval service, but the great majority were soon engaged in the professional fields for which they had prepared themselves.

In the second instance, retrospection and memory provide another picture of more stirring character. A situation comparable to that which you now face came in 1917 when the United States entered the first World War engulfing nearly all the major nations. Throughout the country the fuel of patriotic feeling, which had long been glowing, burst into flame. Men from college and factory and farm rushed to the colors. As at the present time, long before war was actually declared, Technology became essentially a war laboratory and was soon a training ground for many special types of military and naval service. Practically the whole instructing staff and thousands of Alumni and students threw all their energies into the great struggle for the principles of democracy. Almost to a man, the graduating classes of the period were enrolled in the forces of their country. When after the years of conflict the peace had been restored and the problems and confusion incident to the establishment of normal national life had become somewhat adjusted, the great majority of these men returned to the professions and activities for which their technical training had prepared them.

(*Continued on page 402*)

HERE IS THE CHART TODAY'S RESISTOR USERS NEED

Complete—Practical—Easy-to-Use

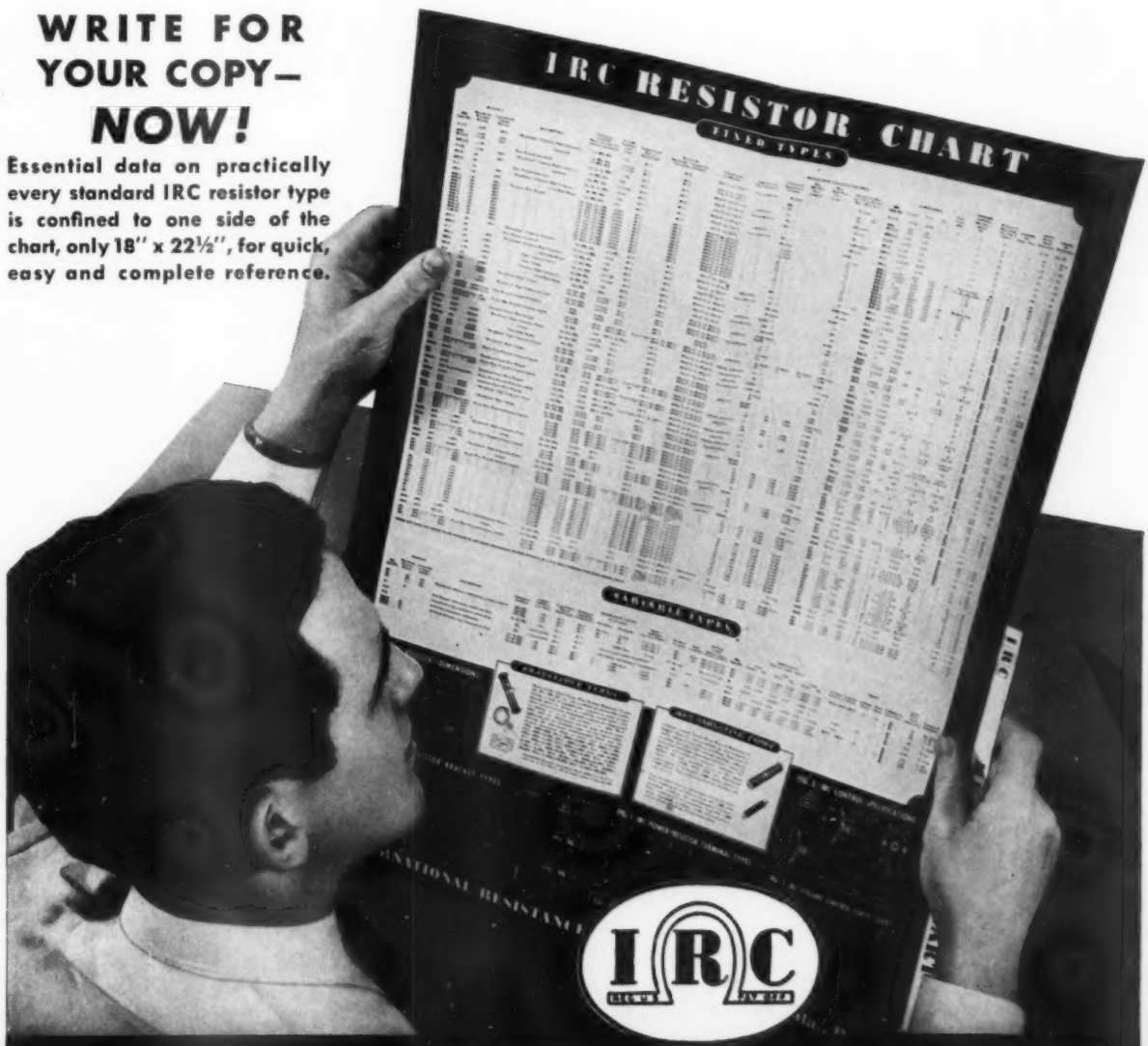
Here, in a single chart—suitable for wall-hanging or desk use—is all of the essential technical data on over 122 sizes in 18 standard IRC fixed and variable resistor types for War and essential industrial use. This up-to-the-minute information includes wattage and voltage ratings, dimensions, resistance values available, terminals, mountings, maximum operating temperatures, temperature rises, temperature coefficients, inductive characteristics, prices in small lots for estimating purposes, availability of various types for army and navy use—everything, in short, to simplify the selection of the right resistor for your electrical and mechanical requirements.

Write for your copy today—or as many copies as may be required to equip everyone in your organization who may have use for it.

WRITE FOR YOUR COPY—

NOW!

Essential data on practically every standard IRC resistor type is confined to one side of the chart, only 18" x 22½", for quick, easy and complete reference.



INTERNATIONAL RESISTANCE COMPANY

401-a N. Broad Street, Philadelphia, Pa.

PROSPECTS AND RETROSPECTS

(*Continued from page 400*)

War experience did not deter these men from subsequent accomplishment or interfere with effective and successful careers. In large measure, the young graduates of that period, possibly in part because of the variety, strenuosity, and responsibility of their experiences, plunged into the normal activities of their numerous technical fields with zeal and efficiency. Today their class lists contain the names of many whose professional success or industrial leadership is unquestioned and widely recognized.

Viewed in the light of history and logic, this experience will be repeated. This war cannot be won by wishful thinking or evasion but only by unified action and clear vision, for "Where there is no vision the people perish." Eventually, if we have the patriotism, determination, and self-sacrifice to use all our vast resources — human, scientific, and material — for the common good, we cannot doubt that America will continue ever to be the land of the free.

Perhaps months or years may be spent, but when victory comes, as it surely will, you who are now ready to give what you have — your training, your splendid strength, and your brave spirit — will take up anew the professional careers that must now be delayed. Strengthened in character by discipline and responsibility, wiser and clearer of vision because of experience, you may reasonably expect to take your full share in the great problems of social, economic, and industrial reconstruction that will certainly demand the attention of clear-thinking and capable men of scientific and engineering training. In your planned prospects let these future duties have thoughtful consideration.

Prospect and retrospect, like action and reaction, are oppositely directed; unlike them, they are not necessarily equal. The one signifies something dynamic, full of promise or action, and bright with hope and faith in the road that lies ahead; the other is static, incapable of positive or direct action, but crowded with precedents and with data often of real value and historic interest, as well as with the kaleidoscopic impressions gathered on the road already traversed. Fortunately, time often diminishes or blots out many of the undesirable and unpleasant impressions and in the summing up of memories leaves to us an algebraic total on the happy side. This I believe to be the experience of most individuals whose work has been constructive and useful, and is especially so in the cases of those whose lives have been spent largely in a college or technical school environment bringing daily contact with exuberant, idealistic, and hopeful youth. In general I think the experience is true of all persons of optimistic nature who have not suffered unusual misfortune and who really love their fellow men.

Looking backward, as you and I now come to the parting of the ways, I can visualize happily not merely your class and the earlier ones with which you have been associated as fellow students, but many others as well. To us of the old school, my emeritus contemporaries and

(*Concluded on page 404*)

A STATEMENT IN UNIQUE FORM

The statement below, made up in an original way, is presented with the object of calling particularly to your attention the care with which the policyholders' interests are protected by the Boston Insurance Company.

Boston Insurance Company
INCORPORATED 1873

Summary of December 31st, 1941 statement filed with Massachusetts Insurance Department

LIABILITIES		ASSETS	
Losses in Process of Adjustment	$ 1,331,009	Cash	$ 1,331,009
Reserve for Losses Unreported	227,000	Cash	227,000
Reserve for Dividends	270,000	Cash	270,000
Unearned Premium Reserve	5,331,172	Cash	799,276
		U. S. Government Bonds	4,531,896
		U. S. Government Bonds and Notes	165,452
		Canadian Government Bonds	227,564
All Other Reserves and Liabilities	2,044,516	State, County and Municipal Bonds	869,364
		Railroad Bonds	303,791
		Public Utility Bonds	149,784
		Other Corporation Bonds	328,561
Capital $3,000,000		Other Corporation Bonds	57,004
Surplus 13,374,092		Stocks	6,420,348
		Stock of Old Colony Insurance Company	7,677,826
		Real Estate (Home Office Building)	975,000
		Premiums in Course of Collection and other Admitted Assets	1,243,914
Policyholders' Surplus	**16,374,092**		
	$25,577,789		$25,577,789

Home Office: 87 KILBY STREET, BOSTON, MASSACHUSETTS
Fire, Marine and Automobile Insurance

WILLIAM R. HEDGE, '96, *President*
HENRY R. HEDGE, '96, *Vice-President*

That Generations to Come May Pause and Remember

For 80 years Wetmore & Morse has been furnishing the granite for the memorials which will commemorate for ages to come, the deeds and the character of men of today—and of yesterday . . . Research men the world over have always looked to the burial place to provide the evidences of the culture of any race . . . That generations to come may pause and remember—plan NOW for the future and insist on Wetmore & Morse Certified Select Barre Granite.

JOHN P. DAVIS
Gen'l Manager

WETMORE & MORSE GRANITE CO.
QUARRIERS SINCE 1862
BARRE VERMONT

PROSPECTS AND RETROSPECTS

(*Concluded from page 402*)

those present associates who, like you and me, will soon be departing from our present official connection with the Institute, you are all as younger brothers as you join your predecessors in the ranks of the graduates. If I may speak for these colleagues as well as for myself, our thoughts of you at this time cannot be better expressed than in these lines from Longfellow:

> And ye who fill the places we once filled,
> And follow in the furrows that we tilled,
> Young men, whose generous hearts are beating high,
> We who are old, and are about to die,
> Salute you; hail you; take your hands in ours,
> And crown you with our welcome as with flowers.

You may be pleased to know we believe that you, like the long train of your student predecessors, have contributed much to the intangible but real rewards of those who have been your teachers. If your technical instruction has sometimes seemed exacting and rigidly emphasizing the application of long-established principles, bear in mind that these must ever be basic in the search for truth, which is the foundation for all science and engineering. We hope, also, that you now feel and will increasingly realize that your instructors were not cold, cynical, and materialistic, but human, warmhearted, cognizant of spiritual values, and deeply concerned for the breadth and fullness of your lives as well as for your professional qualities as you go forth as representatives of the Institute. We see you go with both pleasure and regret, but especially with confidence in your power to do the work of well-trained and educated men. You go with our sincere wish that life will bring you honor, happiness, and professional success and that the prospects now envisioned will be followed by a harvest of satisfying memories.

THE COURSE IS CLEAR

(*Continued from page 374*)

world of trouble at the highest possible point. We want to remember that we are men of spiritual faith and that one of the qualities which bolster our courage at this time, which bolster our faith in ultimate victory in this war, is the fact we are fighting nations which have lost their spiritual faith, which have turned to worshiping the state and are trying to have the state create the same emotional feeling in man that God has always created in him. That to me is one of the most optimistic thoughts which can come to us at the present time, for it is inconceivable to me that men with a faith of that character can possibly triumph over men with your spiritual faith and the high ideals that go with it.

Today people love truth. They want to know the facts. Think of the record that Winston Churchill has made because he told the people honestly that he had

(*Continued on page 406*)

Mutual Boiler Insurance Company of Boston

Incorporated 1877

60 BATTERYMARCH STREET ▪ BOSTON, MASSACHUSETTS

The all-out effort of the United States of America to preserve "a government of the people, by the people and for the people" requires the full capacity of its vast industrial production.

Maximum industrial production depends upon power producing equipment, such as boilers, pressure vessels, turbines, engines, generators and equipment which transmit, distribute and control energy.

The Mutual Boiler Insurance Company is contributing its share toward the continuity of industrial production by regular inspections and power plant engineering supported by 64 years of experience.

Policies of the Company provide indemnity for direct and indirect losses occasioned by unpreventable failures.

"The Oldest Mutual Casualty Company in America"

JOHN A. COLLINS, Lowell '08
Vice-President and Secretary

MARSHALL B. DALTON '15
President and Treasurer

W. W. K. FREEMAN '22
Underwriter

Executives, Engineers, Managers

Uninterrupted production of war equipment is essential if we are to win the war. A fire in your plant would be a victory for the Axis.

Your Plant

SAFE FROM FIRE

will help win VICTORY for us

INDUSTRIAL fires can be prevented. The necessary knowledge is already available. In 1941 ten thousand plants, members of and insured by the Factory Mutual System for over $12,000,000,000, were practically immune from disastrous fires. Less than ten plants, 1/10 of one per cent, had fires that caused any appreciable reduction of output; even with these the curtailment was partial. The remaining 9990 plants went on undisturbed to win the battle of production.

When You Build a New Plant

or when you convert a Plant to war production consult the

FACTORY MUTUAL COMPANIES

Take advantage of 107 years' experience in industrial protection

ARKWRIGHT MUTUAL
Fire Insurance Company
E. V. French, '89, Pres.

BOSTON MFRS. MUTUAL
Fire Insurance Company
M. B. Dalton, '15, Pres.

COTTON & WOOLEN MFRS.
Mutual Insurance Company
E. H. Williams, '16, Pres.

FALL RIVER MFRS. MUTUAL
Fire Insurance Company
M. B. Dalton, '15, Pres.

WORCESTER MFRS. MUTUAL
Fire Insurance Company
W. E. Buck, '76, Pres. Emeritus
M. B. Dalton, '15, Pres.

60 BATTERYMARCH STREET, BOSTON, MASSACHUSETTS

District Offices

New York ▪ Buffalo ▪ Toledo ▪ St. Louis
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WHAT ARE YOU STARING AT?

SUCH SMOOTHNESS shouldn't be new to you. You'd see your face that smooth—every morning—if you'd use Barbasol! Don't expect the girls to line up for a sandpaper sour-puss who uses old-fashioned shaving methods. Get yourself a Barbasol Face!

"ONE PICTURE WORTH 10,000 WORDS"

as the Chinese say. Let your mirror picture you with a Barbasol Face. See how Barbasol's beneficial oils soothe and smooth your skin, leaving it fresher, younger-looking. Fastest shave you ever had, too! No brush, no lather, no rub-in. Try America's favorite shaving cream. Big tube 25¢. Giant tube, 50¢. Family jar, 75¢.

FRANK B. SHIELDS, '07
EDWIN M. McNALLY, '18
LEON P. BREZINSKI, '29
RICHARD L. BERRY, '30

For modern shaving — No Brush—No Lather—No Rub-in

THE COURSE IS CLEAR

(*Continued from page 404*)

nothing to offer but blood, sweat, and tears. And think today how we seek to know the truth about what is going on in the world. We want to know the facts, and we want to hear the truth spoken by men in responsible positions.

Incidentally, it is more practical always to tell the truth! For the last 20 years, I have happened to be in public office, where a lot of pulling and hauling go on. At first a man on one side of the question will hammer the public official pretty hard trying to get admissions from him, and then a man on the other side of the question will hammer him, also trying to get admissions from him. When questions of that character have come up and it is rather difficult to know just how to make a decision, I have told myself many times to tell the truth to each man and let it go at that. It is the best answer, practically. But morally and spiritually, too, you feel better if you tell the truth.

There is also the question of perseverance — the question of knowing when to compromise or knowing when there is only one way in which to go. Here no dogma can be laid down. If you know that a stand which you are taking is the right one, whether it is in science, government, law, medicine, or anything else, then you have got to stick to that decision no matter what the other side may say. But when no question of moral right is involved, the question of how far to go to work out a happy compromise of different points of view comes in.

Above all, in order to meet questions like these, you must have courage — physical courage and intellectual courage. As members of the Class of 1942, you have intellectual courage, or you would not be sitting here today in your caps and gowns. You have had the ability and perseverance to get through the difficult course that is offered here at Technology. But that same intellectual courage and persistence which enabled you to be here today must be carried on in after life in whatever endeavor you undertake.

Those words, "To look up and not down," can almost by themselves constitute a character in all that the term implies. But we come to the words, "To look forward and not back." Put those to the practical test. The winner of the marathon race in Boston this spring illustrates it. When somebody asked him if he had been worried during the race because the second man was so close to his shoulder, he answered: "I don't care who's behind me or where they are, because I never look back. I'm always looking ahead, getting a line on the runners out in front, how they're doing, and figuring my race."

We hear a lot today about security. True, we all want security, but if we are going to be secure we cannot be entirely successful. If we do not take any risks, then we are never going to get ahead. This is still an age and a country of individualism. The laissez-faire doctrine, they say, is out. Maybe it is in part, but the laissez-faire doctrine is never out to a man who is going to get ahead and make the most of his life. At the same time, we have to be willing to assume responsibility. You men have to be ready to take on the responsibilities that may go with your new jobs.

(*Continued on page 408*)

Look in your atlas for the answer. . . to full-flavored coffee

HIGH UP

in South America's Mellow Flavor Zone

Fine coffee flavor is a matter of geography. 3000 miles away, high up on the sunny slopes of the Mellow Flavor Zone, grow the world's finest coffees.

To other choice coffees, Beech-Nut adds a generous extra helping of those precious mountain-grown beans . . . to make a coffee that's really a great experience in flavor. Try Beech-Nut Coffee soon.

It's easier to make fine coffee with Beech-Nut

You can't go wrong with Beech-Nut because of that extra measure of flavor in every cupful.

Also in GLASS JARS
VACUUM-PACKED
2 GRINDS • DRIP & STEEL CUT

IN 2 GRINDS:
Drip Grind — Steel Cut
VACUUM-PACKED

Beech-Nut COFFEE

The fine-flavored coffee . . . at the moderate price

BLUEPRINTS *vs.* BOTTLENECKS

Don't allow delay in receiving blueprints to hold up production.

Such hold-ups stymie your efforts as much as delayed materials.

ELECTRO SUN SERVICE means you receive prints on time.

Also, we have a complete plant for **PHOTO PRINTS** and **OFFSET PRINTING** – all under one roof.

WE'LL HELP KEEP 'EM ROLLING AND FLYING

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361 WASHINGTON STREET BArclay 7-2334
GRAND CENTRAL TERMINAL BLDG. MUrray Hill 6-6526

TRADE MARK
HEVI DUTY
REGISTERED U.S. PAT. OFFICE

Hevi Duty Electric Co.

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THE COURSE IS CLEAR

(*Continued from page 406*)

The men in our time whose careers are worth emulating have done just this thing. I was recently talking to such a man in Springfield, who told me that he had worked 26 years in one firm. He is now one of the largest manufacturers of war products in the western part of Massachusetts. He did not have the opportunities of an education such as you have had. He went into the firm as a messenger boy at the age of 16, and he is now the head of that firm. I like to think also of the life of one of the former professors at the Harvard Law School who now is an associate justice of the Supreme Court, Felix Frankfurter. He was not even born in this country, did not grow up with the language, yet through hard work, scientific knowledge, and willingness to take responsibility and risk, he has risen to the top. Those are individuals; those are goals toward which we want to look. Those men have made a success of their lives because they have been willing to work, to take a chance, and to assume responsibility.

Finally, we come to the words,

> To look out and not in — and
> To lend a hand.

Where are we going to get if we are selfish? Where are we going to get if we think just of ourselves? Today the high ideals of our country, of our American way of living, start with a good family life. Next come civic responsibilities, for with a good family and a good home to which to go, we want the community in which we live to be a good community. Thus we go from the community to the state and to the nation, and that is the background of our democratic form of government.

How can a man get into public affairs, a man of your age? There are five ways in which a man can take part in the public affairs of his community: He can be a teacher — a teacher of government, history, or economics, in a school or college. He can be a commentator, like Walter Lippman, Dorothy Thompson, David Lawrence, or any of the others whom we read in the daily papers. He can be a scientific man who has received an appointment as a doctor of public health, as a physician in charge of a mental institution, as a scientist in agriculture, or in any of the other categories in which men of that training are engaged. He can be just a good member of the community who helps other people in his afterhours, who makes it, for the time being, his avocation to

(*Concluded on page 410*)

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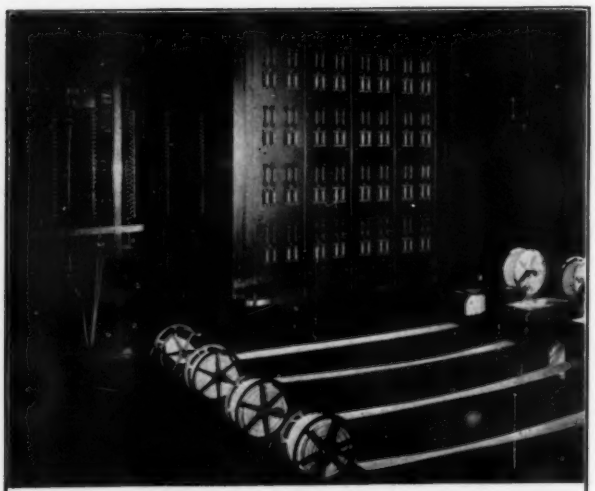

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THE COURSE IS CLEAR

(*Concluded from page 408*)

help raise money for a hospital or to help elect to public office somebody in whom he believes. Finally, he can seek success at the polls. There are all those ways of living up to our democratic ideals of looking out, not in — and lending a hand.

So it seems to me the path of the Class of 1942 is a clear one. When we win this war — and we are depending on you to win it — then you are going to help to convert the wartime world with all its scientific equipment to a peacetime basis. To accomplish that task, you need character, you need the will to succeed, you need a good family life, and you need a feeling of scientific responsibility rather than wealth. The words of Edward Everett Hale, repeated twice by Dr. Eliot — when he took over the presidency of Harvard and on his ninetieth birthday celebration — are hence just as good today as they were then:

To look up and not down,
To look forward and not back,
To look out and not in — and
To lend a hand.

THE INSTITUTE GAZETTE

(*Continued from page 380*)

which we are fighting to defend. It is these principles and the idealism that lives in the traditions and people and structure of these United States of ours which give to us all the power to carry on in this time of crisis.

Training for Defense

IN recognition of the rapidly increasing industrial opportunities for women with specialized technical training, the Institute this summer will offer a full-time course in aeronautical engineering which will be open to 25 young women who hold bachelor's degrees from recognized colleges. The purpose of the course is to utilize the natural aptitudes and qualifications of women for subprofessional service as aeronautical engineering assistants on the staffs of aircraft factories. The duties for which the course will prepare include the operation of advanced calculating machines, the scaling of drawings, the computation of the properties of airplane wings, the solution of mathematical problems, the

(*Continued on page 412*)

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DIEFENDORF GEARS

THE INSTITUTE GAZETTE

(*Continued from page 410*)

graphical integrating of areas, the observing and the recording of test data, and the plotting of data curves. Women applying for the course are expected to have had college mathematics up to, and including, an introduction to calculus; to have taken college physics through three semesters, with laboratory work; and to have an aptitude for the natural sciences. The course, which is to be given under the Engineering, Science and Management Defense Training Program, begins on June 22 and will end on September 12. The subjects to be covered include elementary engineering mechanics, an introduction to engineering drawing, applied mathematics, and an introduction to aeronautics.

Enrollment in the 34 subjects which were given from October to March in the E.S.M.D.T. Program at Technology included 1,107 civilians and 250 from the armed forces of the country. Twenty-eight per cent of the students registered had attended previous defense courses.

The Institute's defense training work, of course, is part of the larger program in which six educational institutions in the Greater Boston area are participating. Administration of the Greater Boston undertaking is done by the Defense Training Bureau at Technology, which serves as clearinghouse for registration and operation for the six participating institutions.

College graduates among students registered in the civilian defense courses given by the Institute represent a wide variety of professional fields. Mechanical engineers head the list, with 52 registrants. Civil engineers, electrical engineers, chemists, and chemical engineers are next in order.

Visiting Committee Report

SPECIAL problems confronting college students in time of war are discussed and solutions for them suggested by the Visiting Committee whose report follows.

DEPARTMENT OF MILITARY SCIENCE AND TACTICS *

As a result of the accelerated program of instruction in Technology and many other institutions, students will lose the opportunity to earn money during at least one of the summer terms; that is, during those sessions used for instruction in order to move forward the date of graduation. Two important results are: First, some students already in these institutions will be unable to complete their education because of inadequate funds; and second, many promising students in the secondary schools, faced with the certainty of a greater cost for their college education, will find the outlook so unsatisfactory that they will prefer to enlist in the armed forces immediately or to accept jobs in industry, with the resulting failure to qualify themselves to the extent that would otherwise be possible.

(*Continued on page 414*)

* The members of this Committee for 1941–1942 are Thomas C. Desmond, '09, Chairman; Stuart C. Godfrey, '07, brigadier general, United States Army; Donald G. Robbins, '07; Theodore B. Parker, '11; Egbert C. Hadley, '14; Sherman Miles, major general, United States Army; and F. B. Wilby, major general, United States Army, who was unable to participate in the preparation of this report.

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Howey V. Freeman '16
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THE INSTITUTE GAZETTE

(*Continued from page 412*)

This problem is believed to be serious from a military point of view, because the technical branches of the Army will require thousands of additional officers during the next few years, and, in order to obtain them, all young men who are potential candidates for such commissions should, if possible, continue their education.

Past experience indicates that the men who have earned part of their education, and who have had to face the solution of personal financial problems, are apt to be the more mature men who have better qualifications for leadership. Therefore, the loss of these men from the educational process may remove a much greater than a corresponding proportion of the best potential officer material.

In general three types of solution appear to be available: The first is to increase existing allowances; the second is to create military scholarships or some other new type of government aid; and the third is to make some use of loan funds already existing at certain institutions, possibly supplemented by additional grants from other sources.

Increased allowances at present Reserve Officers' Training Corps institutions. The present commutation of subsistence allowance might well be increased from the current twenty-five cents a day to approximately $1.00 a day. This sum would nearly correspond with actual costs of subsistence for students at various institutions and, extending over a 16-month period, a substantial additional sum would be provided. This figure might well be supplemented by the following means: The present clothing allowances for students in advanced courses could be increased to cover the actual costs of uniforms at present required plus sufficient additional uniforms so that the student would have them to wear full time and thereby save the cost of civilian clothing. An increase in the present allowance, which is approximately $36, to about $150, is estimated to be required for this purpose.

Another means of increasing the financial compensation of students under existing R.O.T.C. procedure has been suggested. This plan is to pay the student at the former summer-camp rate; that is, $1.00 a day during the summer or summers that he must attend school as required by the accelerated program of instruction.

Military scholarships payable by the government. Possibly a more equitable procedure would be to augment the allowances, as has been suggested, but, in addition, to have the government pay the tuition for selected students taking the advanced course. These students would be required to meet academic and military standards, and they would be expected to compensate the government for the added expenditure involved by definitely assuming an obligation to accept a commission.

This procedure could readily be applied to non-R.O.T.C. institutions through careful selection of individuals concerned and by supplementing their academic instruction by one or more summers of active duty with the Army. Enrollment in the enlisted reserves with call to active duty for summer training would provide the satisfactory *modus operandi* in applying this solution.

It is considered especially important in connection with the possible use of military scholarships in non-R.O.T.C. institutions that care be taken to avoid any lowering of standards or any reversion to something approaching the Students' Army Training Corps in effect during the last war. Such a

(*Continued on page 416*)

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THE INSTITUTE GAZETTE

(*Continued from page 414*)

condition is well guarded against in the R.O.T.C. institutions by the existing procedure in selection of those to take the advanced course.

Financial aid from other sources. Many of the educational institutions have now provided student loan funds, and it is felt that the use of these funds could preferably be made available to selected students who show promise of becoming officer personnel. New private contributors to existing loan funds or donors of new funds might be encouraged and solicited by the schools to assist the students in remaining until graduation. It is believed that the government could set up a loan fund to be administered by each school and supplemented from various sources that are available in the schools for student loans. In many cases where the schools now have a loan fund, the plan of administration is rather well established to care for conditions existing up to the present time, and unless a new source of income can be provided by the government, no increase would be available for the students pursuing advanced military work.

If provisions are made for increasing the allowances of students, the same careful selection that is now practiced in choosing men for the advanced R.O.T.C. units should be continued in order that there may be no lowering of the standards of officer candidates. Of course, all of the students who receive any financial assistance will be regularly enrolled members of the school, and will be physically qualified to receive their commissions when and if offered. It is also considered advisable to require the student before accepting financial assistance to obligate himself to accept the commission when and if offered.

Editor's Note: Since the meeting of the Visiting Committee and the preparation of this report, R.O.T.C. students at the Institute who spend the summer following their junior year in study and who are faced with financial difficulties have been able to find relief. Special scholarship funds have been made available to the Institute for assisting qualified students during the summer, and the Technology Loan Fund has been helpful. In addition, the Army has increased the clothing allowance to students in the advanced R.O.T.C. Through these and other ways, students at the Institute have been cared for and to this extent the recommendations of the report have been put into effect. Through this report, the larger question of over-all aid to students in R.O.T.C. colleges throughout the country has been brought to the attention of the War Department by President Compton.

From the Polls

FOR the ensuing year, these officers have been elected to serve the Alumni Association: Francis A. Barrett, '24, President; Edwin D. Ryer, '20, Vice-President for two years; and Arthur L. Shaw, '09, and Ezra F. Stevens, '27, members of the Executive Committee for two years. B. Edwin Hutchinson, '09, Duncan R. Linsley, '22, and Richard L. Bowditch, '23, have been elected alumni term members of the Corporation of the Insti-

(*Continued on page 418*)

Francis E. Buckley '15, Treasurer

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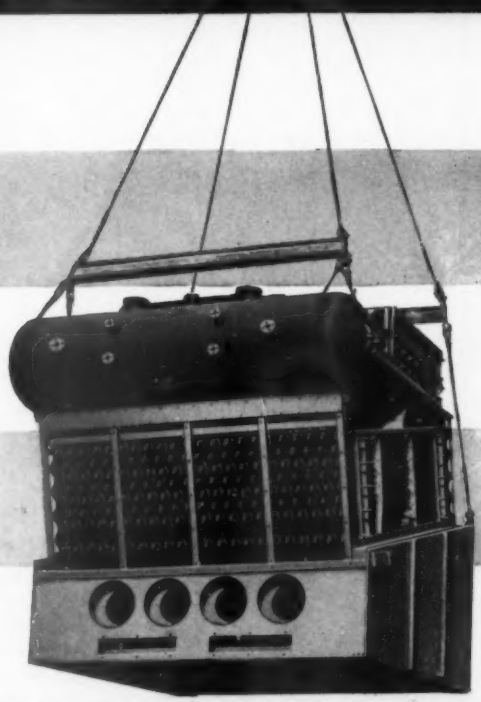

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THE INSTITUTE GAZETTE

(*Continued from page 416*)

tute. In the contest for membership on the National Nominating Committee of the Association, Frederick D. Murdock, '13, was elected to represent District 3; George W. Spaulding, '21, District 6; and Sherry O'Brien, '17, District 7.

Robert H. Richards, '68, George M. Tompson, '73, Alfred S. Higgins, '78, Julien W. Vose, '83, John C. Runkle, '88, Frederic H. Keyes, '93, Edward S. Chapin, '98, James A. Cushman, '03, Herbert T. Gerrish,'08, R. Charles Thompson, '13, F. Alexander Magoun, '18, Howard F. Russell, '23, George I. Chatfield, '28, Robert M. Kimball, '33, and Richard Muther, '38, were elected representatives of their respective classes on the Alumni Council.

Athletes

HIGHLIGHTING Technology's sports program in recent months was the showing of the freshman wrestling team. Both last year under Joseph T. Rivers, Jr., '41, and this year under the tutelage of the new head coach, John H. Lutz, this team kept clean its victory slate. Included among the vanquished teams this year were Harvard, Tufts, and Springfield freshmen, and Governor Dummer Academy. Last year's freshmen were victorious over Moses Brown School, Governor Dummer Academy, Suffield Academy, and Harvard and Springfield freshmen. The varsity record in wrestling this year was three wins (Harvard, Amherst, and Tufts) and two losses (Williams and Wesleyan).

Oscar Hedlund's mile-relay team, although it ran third against Syracuse and Cornell at the Boston Athletic Association games, made the unofficial time of 3:27.6, which is two-tenths of a second under the official record of 3:27.8 made in 1941 by George W. Clark, '41, Sidney L. Hall, '43, Eugene J. Brady, Jr., '42, and Lewis T. Jester, Jr., '41. At the Millrose games in New York, Technology was second to Williams in a mile-relay race and was followed across the finish line by Amherst and Columbia. In the relay races of the Intercollegiate Association of Amateur Athletes of America held in New York, the Institute's relay team, by run-

(*Continued on page 420*)

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THE INSTITUTE GAZETTE

(*Continued from page 418*)

ning the mile in 3:25 — 2.8 seconds faster than the established Technology record — won fourth place and two points for M.I.T. The individual times of the runners were as follows: Robert B. Meny, '44, in 51.8 seconds; Edwin H. Stewart, Jr., '43, in 51.4 seconds; Eugene J. Brady, Jr., 50.8; and Sidney L. Hall, 51.0.

On the cinders, Oscar Hedlund's charges, sparked by the members of the record-breaking relay team, have defeated both Colby and Bates by decisive margins. The track meet of the New England Inter-Collegiate Amateur Athletic Association, in which Frank H. Briggs, '81, took an active role for years, has been canceled because of the academic speed-up at New England colleges.

The basketball squad, under Head Coach Henry P. McCarthy, finished its season with a record of four wins and six losses. The games won were registered over New Hampshire, Middlebury, Bates, and Vermont, and games were lost to Harvard, Brown, Boston University, Tufts, Lowell Textile, and Williams.

Technology's crews — coached by Bob Moch, former University of Washington freshman coach; Jim McMillin, No. 5 oar in the 1936 Olympic crew; and the venerable veteran, Pat Manning — have completed a stiff rowing schedule. On Alumni Day, April 25, the sixth regatta in memory of Allan Winter Rowe, '01, was held on the Charles River. Crews from Boston University, Cornell, Harvard, Syracuse, and Technology competed in a colorful regatta that ended with Harvard and Cornell fighting for the coveted trophy. The varsity crews finished in the following order: Harvard, Cornell, Syracuse, M.I.T., and Boston University. Technology crews also participated at Princeton on May 2 in the Compton Cup Regatta, which was won by Harvard. On May 16 the Adams Cup Race was rowed on the Charles, with the crews finishing thus: Harvard (9:18.6), Wisconsin (9:25), Navy (9:25.2), M.I.T. (9:27.8), and Pennsylvania (9:33).

Two coaching resignations have been received by the Advisory Council on Athletics. They are from John J. Jarosh, '30, varsity coach of swimming since 1935, and Robert H. Maddux, varsity coach of lacrosse since 1938, both of whom had been retained on a part-time coaching basis. They have served Technology well and are leaving to accept better positions outside New England in their respective professional fields. Maddux' lacrosse team has completed the most successful year in the history of this sport at M.I.T., with victories over Harvard, Tufts, Boston Lacrosse Club, and the University of New Hampshire.

Summer Session

THE forthcoming Summer Session will find the Institute engaged to the limit of its resources in research and education in fields important to advancement of the nation's war effort. Under the accelerated schedule

(*Continued on page 422*)

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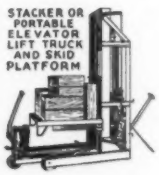

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THE INSTITUTE GAZETTE

(*Continued from page 420*)

for seniors, the Class of 1943 will begin its work early this month to permit graduation next February. Registration of students in other categories, including an impressive contingent of army and navy officers, is expected to be the largest in many years. A number of conferences on various subjects of importance to public health, research, and industrial production are also scheduled for this summer.

A course in industrial statistics, of value to workers in industrial plants and scientific laboratories who require the rudiments of modern statistical technique as applied to inspection, to the design and analysis of factory and laboratory experiments, and to the control of the quality of industrial output, is being given between June 15 and 27 by George P. Wadsworth, '30, Assistant Professor of Mathematics, and Harold A. Freeman, '31, Assistant Professor of Statistics.

The annual summer conference on spectroscopy and its applications, the tenth in a distinguished series which has always attracted wide attendance, will be held on July 20, 21, and 22. This year the conference will be sponsored jointly by M.I.T. and the Optical Society of America, which will hold a meeting here at the same time. The conference will be under the direction of Professor George R. Harrison.

To meet the growing shortages in the profession, an intensive and accelerated training for public health workers is being initiated this summer under the direction of Clair E. Turner, '17, Professor of Biology and Public Health. This program will provide adequate training for public health administrators, public health engineers, public health bacteriologists, and public health educators.

The initial phase of the program begins on June 8, and will continue through July 24. A second seven-week session will cover the period from July 27 to September 12. In addition, the Institute is offering four accelerated

(*Continued on page 424*)

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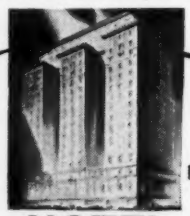

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THE INSTITUTE GAZETTE

(*Continued from page 422*)

courses of graduate study leading to the degree of master in public health or the certificate in public health. These start on June 8 and will continue through February 6, 1943. One of them is of special interest to public health engineers and is open only to graduates of recognized schools of engineering. A second one, to be offered for public health administrators, is open only to graduates of approved medical schools. A third program, for public health bacteriologists, enables college graduates who have a basic training in physics, chemistry, and biology to do diagnostic laboratory work with military or civilian organizations. The fourth course is being offered for the training of health educators, for whom the demand far exceeds the supply.

A summer program in city and regional planning, to be given under the joint sponsorship of the School of Architecture and the American Society of Planning Officials, is scheduled for July 13 to 31. The program was arranged to meet the need for an intensive course covering both administrative and technical aspects of city and regional planning. The program will be in charge of Frederick J. Adams, Associate Professor of City Planning, and Flavel Shurtleff, Associate Professor of Planning Legislation and Administration.

The national meeting of the applied mechanics section of the American Society of Mechanical Engineers is being held in the Department of Mechanical Engineering on June 19 and 20. The program will include papers on applied mechanics and the strength of materials, with special reference to problems which arise in war production.

A summer course in photoelasticity will be offered by the Department of Mechanical Engineering from July 27 to August 7 to meet the demand for men with special training in various methods of stress analysis.

A conference on fire protection engineering, a subject of urgent importance in industry during the war emergency, is being held on June 22, 23, and 24 under the joint sponsorship of the Department of Building Engineering and Construction and the School of Architec-

(*Concluded on page 426*)

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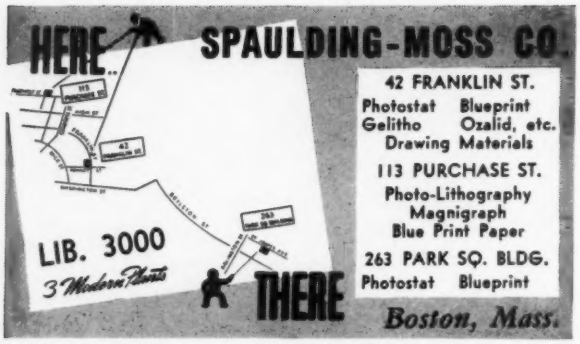

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THE INSTITUTE GAZETTE

(Concluded from page 424)

ture in co-operation with the National Fire Protection Association. The conference is open to industrial and consulting engineers, architects, building officials, fire chiefs, civilian defense officials, and secondary-school teachers.

Commencement

THE Class of 1942, completing its work six weeks ahead of the Institute's normal undergraduate schedule, was graduated in Symphony Hall, Boston, on the morning of April 27, and its 469 members quickly dispersed to take their places in the nation's armed forces and important war industries. More than 2,000 relatives and friends of the Class witnessed the ceremonies and heard the commencement address of Samuel C. Prescott, '94, who retires this year as dean of science, and the thoughtful message of President Compton.

This year's senior class included 454 bachelors of science, 14 bachelors in architecture, and 1 bachelor of architecture in city planning. Commissions in the Officers' Reserve Corps of the Army of the United States were awarded to 108 men. At least 43 per cent of the Class entered the Army or Navy Reserve as commissioned officers. The remainder have undertaken work in industry, research, graduate study, or teaching.

The commencement procession was led by Alexander Macomber, '07, chief marshal, and the invocation was given by the Rev. Michael J. Ahern, '06, head of the seismology department of Weston College. Commissions in the Officers' Reserve Corps were presented by Sherman Miles, commanding general of the First Corps Area. Among the guests of honor in the academic procession were William T. Tarrant, commandant of the First Naval District; General Miles; Maurice J. Tobin, Mayor of Boston; John H. Corcoran, Mayor of Cambridge; B. Edwin Hutchinson, '09, President of the Alumni Association; the retiring members of the Faculty; and members of the 50-year Class.

THE TREND OF AFFAIRS

(Concluded from page 366)

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